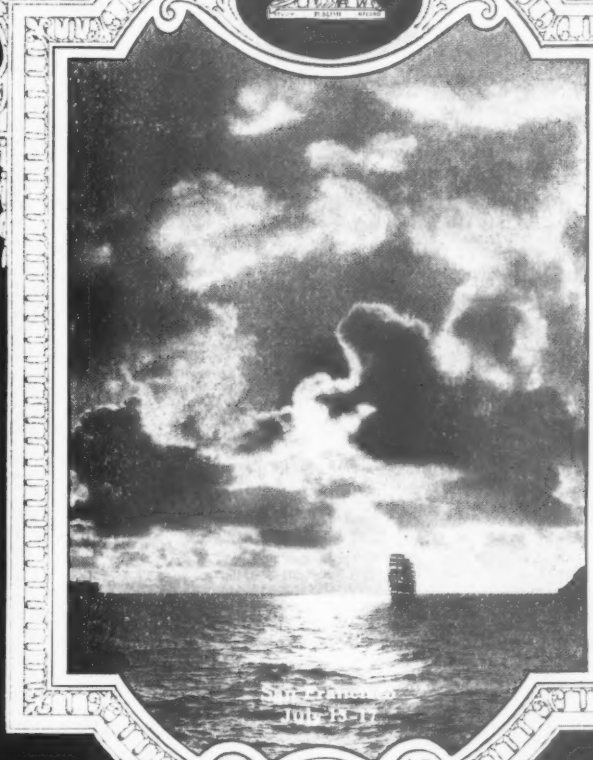
JUNE

THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION



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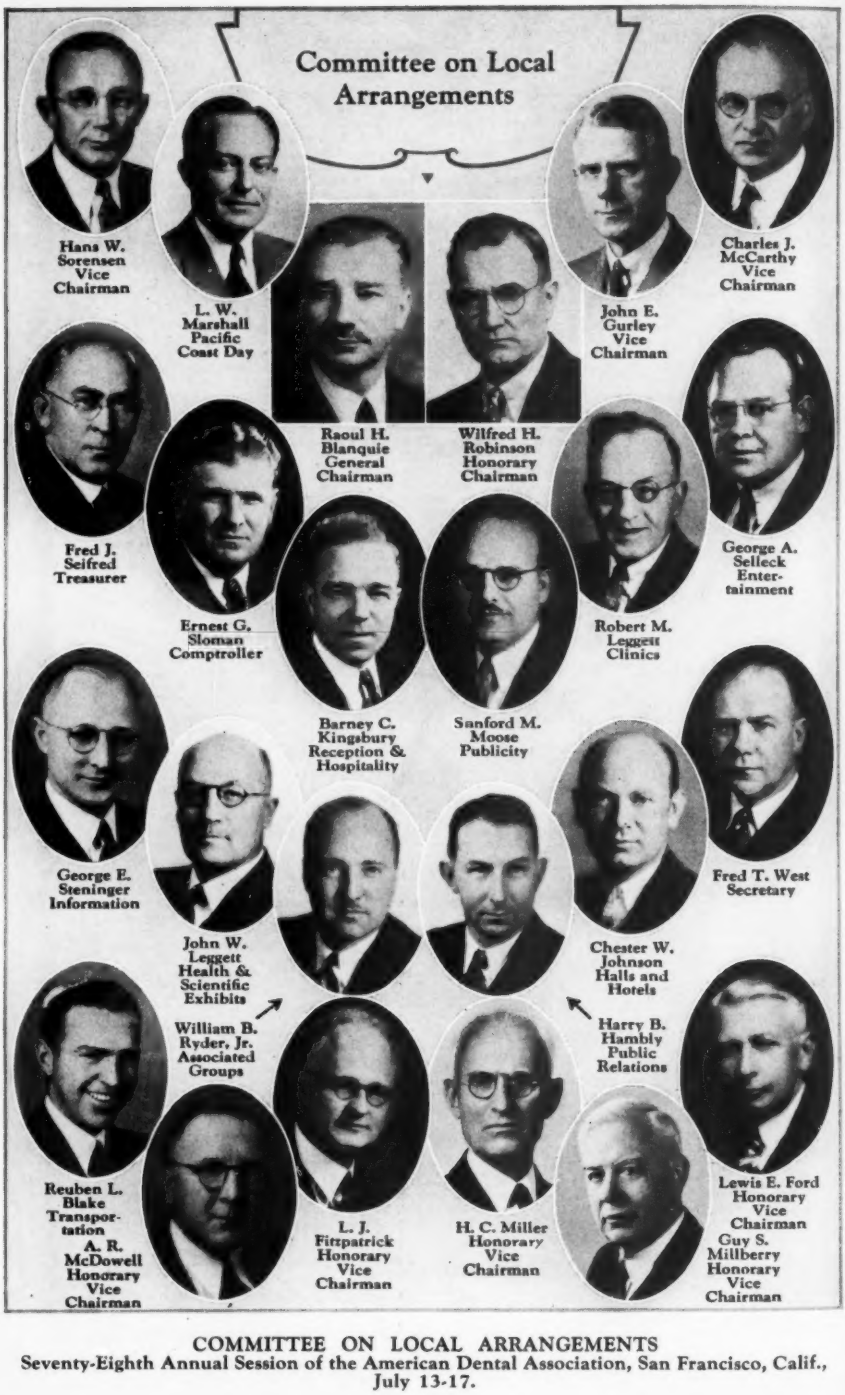
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Original Communications

HEALING OF DISTURBED AND UNDISTURBED EXTRACTION WOUNDS*

By ROLAND S. CLAFLIN, D.D.S., M.D.S., Chicago, Ill.

EXTRACTION of teeth involves a knowledge of procedure to which a great deal of time and attention have been given in dentistry. But the field of healing—that is, the processes that take place after extraction—has hardly been touched on. One condition in particular, dry socket, deserves much consideration and study, for the tooth socket that refuses to heal in the normal way is a difficult problem for the practicing dentist.

In order to study such delayed healing of extraction wounds, it was necessary to produce conditions in dogs similar to dry socket found in man.

*From the Research Department of the Chicago College of Dental Surgery, School of Dentistry, Loyola University.

*Read before the Section on Histology, Physiology, Pathology, Bacteriology and Chemistry (Research) at the Seventy-Seventh Annual Session of the American Dental Association, New Orleans, La., Nov. 6, 1935.

THE LITERATURE

In reviewing the literature on the healing of experimental extraction wounds, the work of the following men was studied: Euler, W. Meyer, Schram, Steinhardt, Balogh, Kittner, H. Meyer and Deebach.

Euler's experiments[1] were carried out at three, six, eight and fourteen day and three, four, six, seven and nine week intervals. The following were considered by Euler in the healing of extraction wounds: (1) hemorrhage; (2) coagulation; (3) thrombosis of the vessels of the alveolar wall; (4) beginning of organization of fibrin in the clot; (5) proliferation of the epithelium over the surface of the wound; (6) resorption of the damaged tissue, and (7) formation of new bone. Euler observed clinically that

1. Euler, H.: Die Heilung Von Extraktionswunden; Eine Tierexperimentelle Studie (Healing of Extraction Wounds; An Experimental Study), Deutsche Monat. f. Zahnheilk., 41:687, 1923.

healing was disturbed if laceration of the gingiva had taken place during extraction.

W. Meyer[2] confirmed Euler's work as to the definite reparative changes in normal healing. The additional work of W. Meyer on disturbed healing will be discussed later on in this paper.

Schram[3] carried on similar work by comparing forceps extraction with surgical removal of teeth, having in mind the osseous regeneration in maxillary bones in dogs. A similar experiment to that of Schram was carried out by Balogh,[4] who studied histologically the healing of wounds after the surgical removal of the facial alveolar plate.

H. Meyer[5] recently carried out on dogs experiments similar to those of W. Meyer and Euler. His findings from histologic examination verify those of the two men mentioned. The ages of extraction wounds in the experiments of H. Meyer were 2 hours, 2, 4, 8 and 14 days and 3, 7 and 10 weeks.

HISTOLOGIC FINDINGS CONCERNING THE UNDISTURBED HEALING OF EXTRACTION WOUNDS IN DOGS

The work of the above mentioned men having been studied, a time period of thirty-one days was established for my experiments in undisturbed healing. It was expected that the wound would be clinically healed after that length of time. In one dog, teeth were extracted daily for five days, this making it possible to have a picture of the early tissue changes from the time of blood clotting to the first bone formation. In a second dog, the extractions were distributed over the entire period of thirty-one days. The first five teeth were extracted at three-day intervals, that is, over a period of fifteen days, and the last four teeth at four-day intervals, or over a period of sixteen days. From these extraction wounds, it was possible to study sockets in all stages of healing.

The dogs were anesthetized by intravenous injection of nembutal (Abbott), using 1 c.c. solution for each 5 pounds of body weight. It was found far superior to ether anesthesia for this type of work.

The description of the histologic changes is as follows: In a wound 1 day old, the blood clot has filled the alveolus up to the crest of the ridge. At this time, the clot shows areas of contraction. The surface of the clot is covered with a fibrin network around a space that is devoid of any blood cells. Such spaces were noted in several of the early wounds. Whether they are the result of normal contraction of the blood clot, I cannot say. In the photomicrograph of a 4-day extraction wound in the work of Balogh,[4] this contracted area of the clot is present in the fundus of the socket.

Figure 1 is a 3-day-old extraction wound of a lower first premolar. The epithelium has started to proliferate across the top of the clot. Osteoclasts are found at the crest of the bone at this time. The presence of osteoclasts at this time is the first indication of bone

2. Meyer, W.: Die Heilung Von Extraktionswunden Unter Abnormen Verhältnissen (Healing of Extraction Wounds Under Abnormal Conditions), Ztschr. f. Stomatol., 22: 521, 1924.

3. Schram, W. A.: Histologic Study of Repair in Maxillary Bones Following Surgery, J.A.D.A., 16:1987-1997 (Nov.) 1929.

4. Balogh, Karoly: Histologische Untersuchungen über die Heilung von Extraktionswunden nach der chirurgischen Entfernung der fazialen Alveolarwand (Histologic Study of Healing of Extraction Wounds Following Surgical Removal of Facial Alveolar Plate), Ztschr. f. Stomatol., 30:281, 1932.

5. Meyer, Hans: Heilungsvorgänge in der Alveole nach normaler Zahnextraktion (Healing in Alveolus Following Normal Tooth Extraction), Schweiz. Monat. f. Zahnheilk., 45:571, 1935.

change. The fibroblasts have started to invade the clot from the walls of the socket toward the center of the alveolus. The insert in Figure 1 is a higher magnification of the clot in a 3-day-old extraction wound. These young fibroblasts (*A*) can be seen among the red blood cells (*B*).

In a 4-day-old extraction wound, the epithelium has continued to proliferate, this making the opening of the alveolus smaller. The clot has contracted from five days' duration of a first premolar. The blood clot is well invaded with young fibroblasts. The new bone can be seen at (*B*) surrounded by osteoblasts. The blood vessels in the remaining periodontal membrane are filled with blood. It appears that after clot formation and during the first stage of healing, the surrounding vessels are engorged with red blood cells. This hyperemic condition can also be noted in the vessel (*F*) just opposite the new bone.

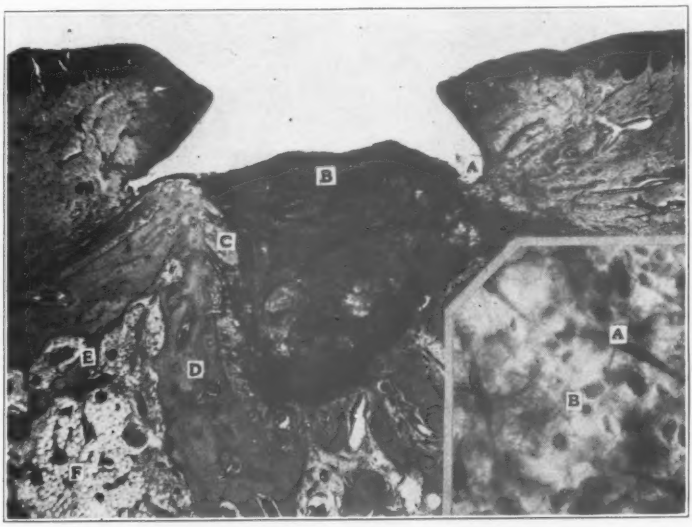

Fig. 1.—Extraction wound, 3 days old, of a first premolar. *A*, proliferation of epithelium; *B*, fibrin network over clot; *C*, remnants of periodontal membrane; *D*, cribriform plate of alveolar bone; *E*, supporting osseous structure; *F*, bone marrow. Insert: *A*, fibroblasts; *B*, red blood cells.

the opening of the socket. The fibroblasts have increased in number.

The first evidence of new bone formation was found at the end of five days. This was earlier than the time at which new bone was found by Euler[1] and W. Meyer.[2]

Figure 2 shows the new bone at this period. This is an extraction wound of

In a 7-day-old extraction wound, the outstanding observation is that the epithelium has covered the opening of the alveolus.

Figure 3 is a photomicrograph of an 11-day-old extraction wound. The epithelium has thickened. New bone (*D*) has filled in from the walls of the alveolus. The original contraction of the clot

is still evident by the dip in the epithelium over the socket.

In an extraction wound 19 days old, the bone has reached the crest. The central portion of the alveolus is still filled with the original clot.

An extraction wound 22 days old is farther advanced in healing. Clinically, it would have the appearance of a completely healed socket, but, in the center of the alveolus near the crest, a portion of the old clot is still left. The new bone that has filled in still shows a slight depression over the openings of the sockets. The epithelium has the appearance of old epithelium with smaller papillae. The subepithelial tissue has the thickness that is usually found over a clinically healed socket. An osteoclastic action is still taking place all along the crest.

In a wound 28 days old, the sockets are well filled with new bone. The outline of the old sockets is still visible. There is no more evidence of the original blood clot. The crest is still uneven, but, through the continued activity of the osteoclasts, the bone surface assumes more

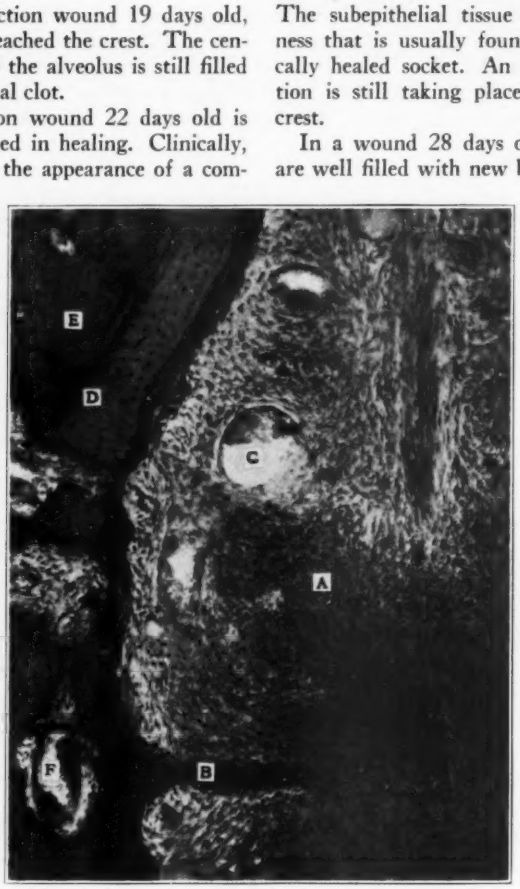

Fig 2.—New bone formation in extraction wound, 5 days old, of a lower first premolar. *A*, blood clot with young fibroblasts; *B*, new bone formation with osteoblasts; *C*, blood vessel within remnants of periodontal membrane; *D*, cribriform plate of alveolar bone; *E*, supporting bone structure; *F*, marrow space with hyperemic blood vessel..

and more of the outline of the overlying tissue.

Figure 4 is an extraction wound, 31 days old, of a two-rooted premolar. The sockets are filled with new bone, but the original cribriform plate is still visible. The epithelium has the appearance of normal tissue. In the center above the crest of interradicular bone is a small alveolus. At this time, active bone changes are still taking place, changing the shape and architecture of the old and new osseous structure, and eventually resulting in the typical lattice work of the spongy portion of the jaw bone. Balogh[4] noted that resorption was still taking place in the old bone at the end of four weeks. Through this process of osteoclas-

Fig. 3.—Extraction wound, 11 days old, of a first premolar. *A*, epithelium covering extraction wound; *B*, subepithelial connective tissue; *C*, blood clot; *D*, new bone formation; *E*, cribriform plate; *F*, bone marrow.

spicule of necrotic bone lying in the subepithelial tissue. The insert is a higher magnification of the osteoclasts at the fundus of this socket. The osteoclasts are not located in the area of new bone, but below the cribriform plate of the original tic resorption, the original cribriform plate is being changed to a more cancellous bone and eventually will be no longer distinguishable from the rest of the spongy bone.

The reparative changes of undisturbed

healing are, in chronologic order, as follows: blood clot, one day; beginning organization of blood clot, from two to three days; first appearance of osteoclasts at the crest of the alveolus, three days; first bone formation in the fundus of alveolus, from five to seven days; epithelization completed, from seven to nine days; socket filled with new bone, from twenty-eight to thirty-one days.

The findings on healing of extraction wounds with special reference to bone changes are as follows: first appearance of osteoclasts, three days; first bone formation, from five to seven days; new bone reaching the alveolar crest, from eleven to fifteen days; sockets filled with bone (except central portion), from fifteen to twenty-two days; bone at crest levelled off, from twenty-eight to thirty-one days; osteoclasts still present at fundus, thirty-one days.

These findings correspond very closely to those of Euler[1] and H. Meyer.[5] The two exceptions were the time for completed epithelization and for new bone formation.

I have found new bone in a 5-day-old

Fig. 4.—Extraction wound, 31 days old, of a lower second premolar. *A*, epithelium; *B*, spicule of necrotic bone below epithelium; *C*, subepithelial connective tissue; *D*, new bone in alveolus; *E*, cribriform plate; *F*, bone marrow. Below: High magnification of osseous structure below cribriform plates at fundus of alveolus. *A*, osteoclasts; *B*, bone of cribriform plate; *C*, bone marrow.

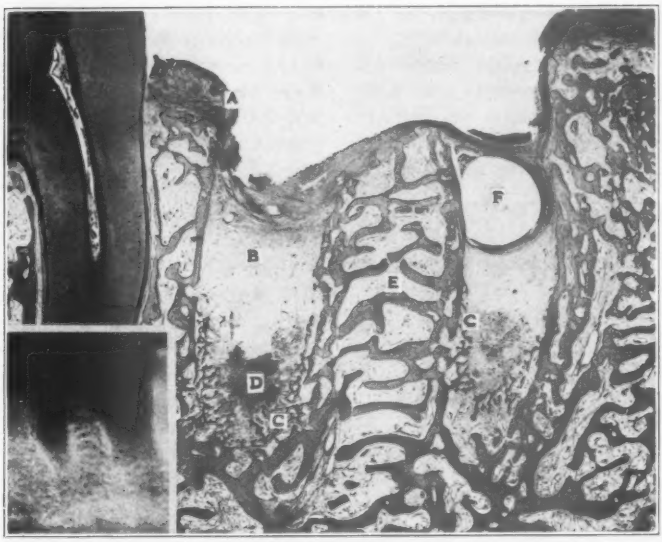

Fig. 5.—Extraction wound, 6 weeks old, of a lower second molar in man. *A*, epithelium; *B*, scar tissue; *C*, new bone in fundus; *D*, remnants of original blood clot; *E*, horizontal spicules of interradicular bone; *F*, abscess cavity. Insert: Extraction wound.

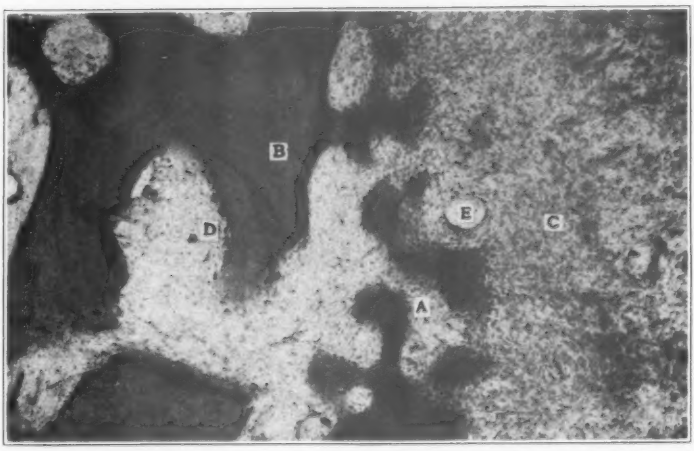

Fig. 6.—Higher magnification of Figure 5, showing new bone formation at fundus of alveolus. *A*, new bone; *B*, cribriform plate; *C*, fibroblasts in clot; *D*, osteoclasts on cribriform plate; *E*, blood vessel.

extraction wound, while Euler did not find new bone until the eighth day.

In my specimens, epithelization was completed in from seven to nine days; in Euler's specimens, on the eleventh day.

The photomicrograph of a wound 6 weeks old of Euler's series resembles very closely Figure 4, showing a thirty-one day extraction wound in my experiment.

Fig. 7.—Dry socket, 1 day old, following extraction of lower first premolar. *A*, exposed walls of socket; *B*, periosteum loosened from outer cortical plates of jaw bone; *C*, necrotic spicule of bone; *D*, thrombosed blood vessels in mandibular canal.

This slight advancement in healing may be accounted for by the difference in diet. The animals used in my experiment were especially well cared for. They received plentiful amounts of raw meat, bread and cod liver oil; a diet which would stimulate tissue repair and regeneration.

HISTOLOGIC FINDINGS CONCERNING THE HEALING OF EXTRACTION WOUNDS IN MAN

Until the last few years, our knowledge of tissue changes accompanying the healing of extraction wounds in man were based only upon clinical observation. In a recent report, Kittner[6] gave a detailed roentgenographic description of the bone changes following tooth extraction. A clinical observation on tooth extraction was recently reported by Deebach.[7]

In 1932, Steinhardt[8] reported the histologic findings in three specimens of extraction wounds in human jaws obtained at necropsy. The time that had elapsed between extraction and death was known.

In the first patient, death was due to leukemia three weeks after the extraction of the teeth. In the histologic specimens, Steinhardt observed the wound covered with epithelium. The socket was filled with young granulation tissue and the

6. Kittner, Ernst Karl: Ueber die Röntgenologisch Wahrnehmbaren Veränderungen am Alveolarfortsatz nach Entfernung von Zähnen (Roentgenologic Changes in Alveolar Process Following Extraction of Teeth), Deutsche Monat. f. Zahnheilk., 51:241, 1933.

7. Deebach, R. F.: Healing Process Following Removal of Teeth Where Injury Greater Than That Sustained in Simple Extraction Is Involved, North-West. D. Res. & Grad. Study Quart., 35:4, 1935.

8. Steinhardt, G.: Pathologisch-Anatomische Untersuchungen der Heilung Von Zahnextraktionswunden und ihrer Komplikationen beim Menschen (Pathologic-Anatomic Study of Healing of Extraction Wounds and Their Complications in Man), Paradentium, 4:122, 1932.

fundus with uncalcified bone. Steinhardt compares this to a 9-day-old or 10-day-old extraction wound in a dog.

The next extraction wound which he described histologically was a socket of a lower bicuspid, $3\frac{1}{2}$ months old. The depth of the socket was greatly reduced by the presence of new bone. The central portion still contained remnants of the original blood clot. The epithelium and subepithelial tissue had covered the wound. On the basis of the findings of Euler, this condition in man would correspond to an 8-week-old extraction wound in a dog.

In the Research Department of the Chicago College of Dental Surgery, Dental School of Loyola University, I came upon a human jaw specimen with a lower second molar that had recently been extracted. In studying the clinical history of the patient, it was found that the tooth had been extracted six weeks before death, because of caries. The patient had died of pneumonia.

Figure 5 is a mesiodistal histologic section through this human jaw, showing both sockets of the extracted second molar. From a general view of this section, one can say that the same reparative changes are taking place as in the extraction wounds in dogs. The only difference is that the extraction wound in man heals much more slowly than in the dog.

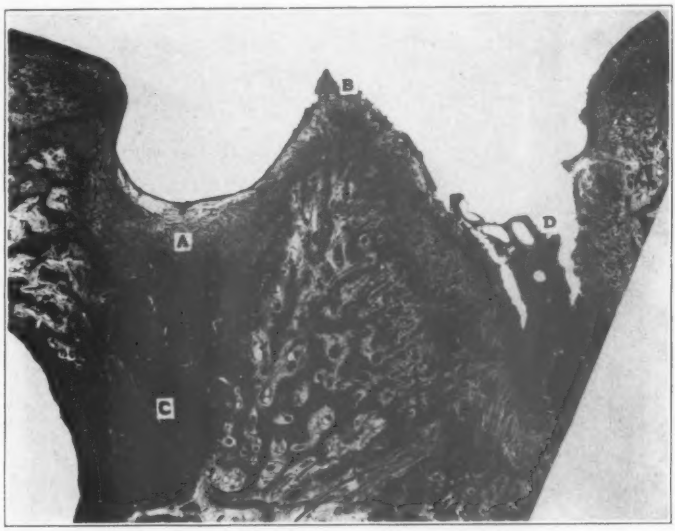

Fig. 8.—Dry socket, 10 days old, following the extraction of upper second premolar, treated with group of drugs. *A*, granulation tissue; *B*, necrotic crest of interradicular bone; *C*, remnants of original clot; *D*, mass of pus cells in distal socket.

On close examination of this section, the fundus of both sockets reveals new bone formation. The sockets are well filled with granulation tissue. In the distal socket, a small abscess cavity is present near the opening of the alveolus. This abscess opens into the mouth, which can be seen by studying serial sections of this

extraction wound. The epithelium has partially closed this wound. The interradicular bone is covered with scar tissue. The middle of each socket near the fundus shows the remnants of the original blood clot.

An interesting difference in the architectural structure of the interradicular bone can be seen by comparing it to the same bone areas in dogs. The spicules of bone in Figure 5 (human) that run from one cribriform plate to the adjacent cribriform plate are mostly horizontal and parallel to the occlusal surface of the teeth; while, in dogs, they appear to be more at an angle or even perpendicular to the occlusal plane. The osseous structure distad from the distal socket in Figure 5 is very different from the bone surrounding the extraction wound. This difference in bone formation around the teeth in man and in dog is probably due to the difference in tooth formation and in masticatory function.

Figure 6 is a higher magnification of the new bone formation in the fundus of the socket shown in Figure 5. The new bone can be noted, originating from the cribriform plates of the socket. The area of blood clot is a mass of young fibroblasts. A small blood vessel has formed just above the new bone. Osteoclasts are destroying the outline of the cribriform plates.

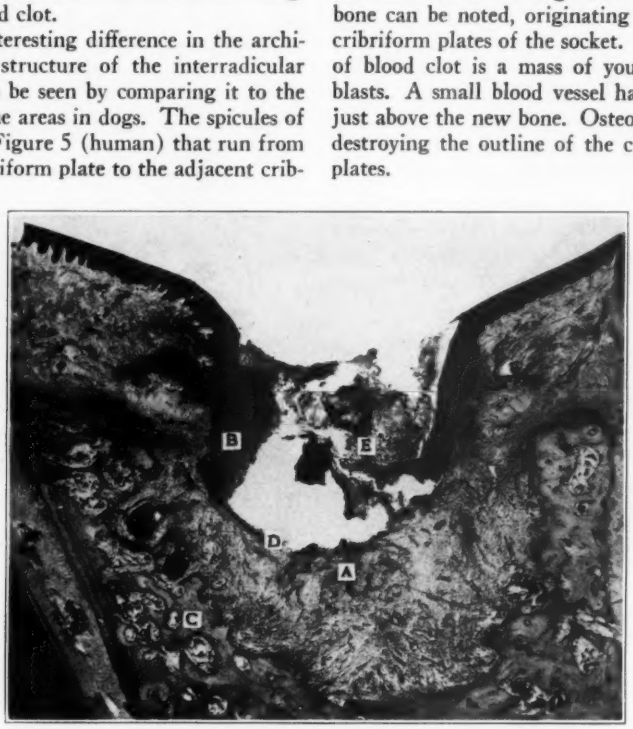

Fig. 9.—Dry socket, 10 days old, treated with glycerine and collodion. *A*, granulation tissue; *B*, epithelium; *C*, cribriform plates; *D*, end of new epithelium; *E*, detritus and pus cells.

In comparing Figure 6 with Figure 2, an extraction wound in a dog, it can be seen that the new bone formation in the human extraction wound is taking place the same way, only much more slowly.

This extraction wound is somewhat behind in the normal reparative changes as compared to the human extraction wound reported by Steinhardt.[8] It has to be considered that good histologic material from

human extraction wounds can be obtained only by necropsy, and since these patients have usually been very ill before death, a varying degree of delayed healing can reasonably be expected.

An interesting diagnostic point has arisen in comparing the roentgenographic appearance of bone regeneration with the histologic section of this same area. In the roentgenogram (Fig. 5, insert), one would be prone to believe that new bone had formed in the lower two thirds of the sockets. The histologic sections disprove this assumption, since only a small amount of new bone is found in the fundi. This can be explained only by the optical projection of the buccal and lingual plate of the alveolar process over the area of the sockets.

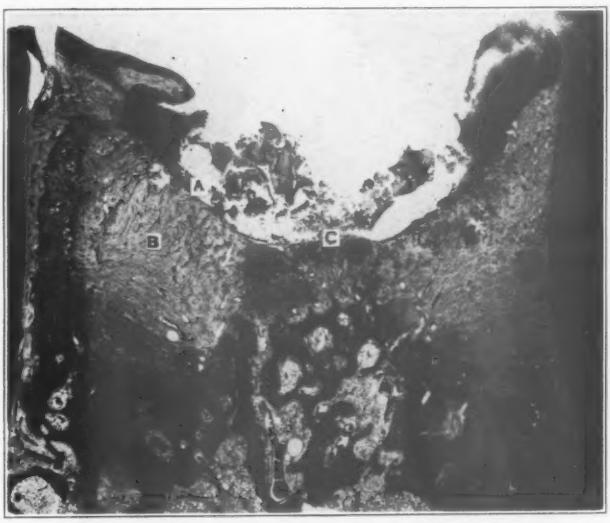

Fig. 10.—Dry socket, 10 days old, treated with glycerine and collodion. *A*, epithelium; *B*, granulation tissue; *C*, necrotic crest of interradicular bone.

ARTIFICIALLY DISTURBED HEALING OF EXTRACTION WOUNDS IN DOGS

In 1924, W. Meyer,[2] of Breslau, carried on an extensive study in dogs on the healing of extraction wounds. After confirming the work of Euler[1] on undisturbed healing, he used several methods of disturbing the normal process as a basis for comparison.

His methods of disturbing the wounds were as follows: (1) circular incision of the overlying gingiva; (2) placing a grain of barley in the extraction wound; (3) placing a tampon in the alveolus, and (4) infecting the wound with streptococci and staphylococci.

Of these wounds that had been infected, some were left alone for controls and others were treated. The interval of the extractions was six days, twelve days and eighteen days, respectively.

The treatment consisted of irrigation with hydrogen peroxide on the second day after infection, followed by insertion of a tampon of iodoform gauze saturated with chlorphenol-camphor.

W. Meyer found that the 12-day-old treated extraction wounds were the only ones that showed a slight advancement in healing as compared to the untreated ones. Six days and eighteen days after extraction and infection, there was no difference between the treated and untreated wounds.

teeth was the same as was used in studying undisturbed healing.

After the extraction of the teeth, a tampon was saturated with a mixed culture of streptococci and staphylococci obtained from an infected human pulp, and then sealed in the socket. It remained in the socket for one day and was then removed. In one dog, the dry sockets were left alone. In the second dog, the infected sockets were treated with an empiric formula which consisted of 5 drops of a 33⅓ per cent alcoholic solution of phenol, 5 drops of glycerin, 5 drops of

Fig. 11.—Dry socket, 10 days old, treated with phenol and collodion. *A*, exposed cribriform plate of socket; *B*, abscess cavity; *C*, granulation tissue; *D*, epithelium; *E*, osteoclasts separating necrotic from living bone.

After studying the processes of undisturbed healing, I produced pathologic conditions in extraction wounds similar to those that we find in man (dry socket). This was carried out in three dogs. The procedure of anesthesia and extraction of

tincture of iodine and enough collodion to make a paste. This paste was inserted in the sockets. In the third dog, the sockets were treated with the individual drugs of this empiric formula, each mixed with collodion. The purpose of this last experiment was to determine whether any one drug was more effective than the others in promoting the healing process. In the last two dogs, the experiment was carried over six and ten days of treatment. Some of the infected sockets in each dog were left untreated for controls.

Figure 7 is a photomicrograph of a dry socket 1 day old. Because of the infection, the blood clot is completely absent and the socket is empty, a "dry socket." The periosteum has pulled away from the outer plate of the mandible. The crest of the alveolus is necrotic. This type of dry socket would probably result in exfoliation of the alveolus *en masse*.

Figure 8 shows a dry socket, 10 days old, treated with the mixture of phenol, iodine, glycerine and collodion, as described above. The mesial socket is completely filled with granulation tissue, and the epithelium has covered part of it. A piece of necrotic bone lies above the interradicular septum, separated by granulating tissue from the living bone beneath. In the other socket, a mass of pus cells, fibrin and exudate is present. The distal wall of this socket is still exposed and necrotic.

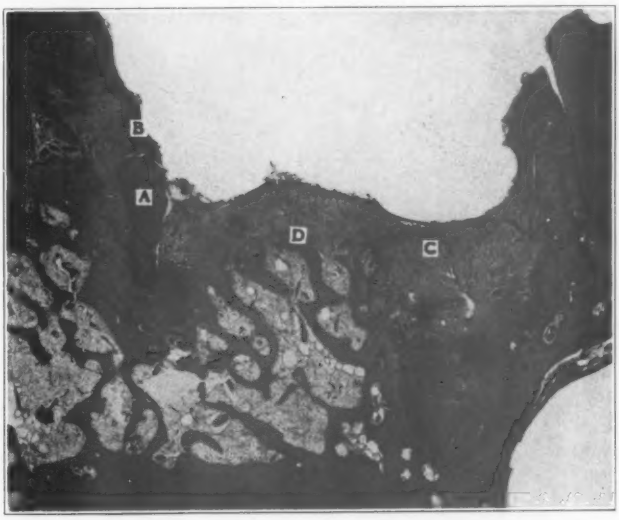

Fig. 12.—Dry socket, 10 days old, treated with iodine and collodion. *A*, fractured root tip; *B*, epithelium; *C*, granulation tissue in socket; *D*, area over interradicular bone covered with granulation tissue.

Figure 9 shows a dry socket, 6 days old, treated with collodion. The socket is filled with granulating tissue in the lower one-third. The epithelium is starting to grow down along the sides of the alveolus to cover the wound.

Figure 10 shows a dry socket, 6 days old, treated with glycerine and collodion.

The alveolus is filled with scar tissue; the interradicular bone is covered with granulating tissue. The epithelium has started to cover the opening of the sockets.

Figure 11 shows a dry socket treated with phenol and collodion. This socket is still in a stage of active abscess formation. Granulating tissue has covered the distal wall. The mesial wall is still exposed and active bone resorption is present, which tends to separate the necrotic from the living bone and to throw it off as a sequestrum.

Figure 12 shows a dry socket treated with iodine and collodion. In the one socket, a root fragment is still present, but all the osseous structure has been covered with granulating tissue. In the other socket, the epithelium has started to proliferate to cover the wound.

Figure 13 shows one of the untreated dry sockets, or controls. Both sockets are filled with scar tissue. The interradicular bone at the crest is in a necrotic condition. The infection in this extraction wound extended only to the middle of the sockets. Some remnants of the original clot are still present at the fundus. The epithelium is just beginning to proliferate over the one socket.

Fig. 13.—Infected dry socket, 10 days old (control). *A*, epithelium; *B*, necrotic crest of interradicular bone; *C*, granulation tissue; *D*, remnants of original blood clot.

SPONTANEOUS OCCURRENCE OF DISTURBED HEALING OF EXTRACTION WOUNDS IN DOGS

In the extracting of teeth in dogs, a certain percentage of delayed healing occurred without artificial interference with the wound. In two extraction wounds out of fifty extractions, delayed healing was present.

In these two extraction wounds, the blood clot was lost, for some unknown cause. In one, which was 3 days old, the bone crest was exposed and necrotic, with a small abscess starting to form. The other wound, which was 10 days old, was filling in with granulating tissue from the fundus toward the crest of the alveolus. This last extraction wound had the appearance of a dry socket, and healed the same as those that had been infected artificially.

From this observation, it was concluded that the dog is subject to spontaneous infection of extraction wounds (dry socket) similar to that occurring in man.

SUMMARY AND CONCLUSION

1. The formation of a blood clot was the beginning of tissue regeneration in undisturbed healing of extraction wounds in dogs.

2. At the end of the third day, fibroblasts had proliferated into this blood clot.

3. Osteoclasts were found at the crest of the alveolus on the third day after the extraction of the tooth.

4. Bone regeneration was noted in the lower one third of the fundus of the socket on the fifth day.

5. The sockets were completely filled with new bone thirty-one days after the extraction.

6. Osteoclastic action was still taking place below the cribriform plates in the fundus of the sockets after the extraction wound had healed for thirty-one days.

7. The healing processes in extraction wounds in man are the same as in dogs, only much slower.

8. The healing of disturbed extraction wounds was delayed as compared with healing of wounds that had been undisturbed.

9. Dry socket can be produced experimentally in dogs. Delayed healing similar to that in dry socket in man occurred spontaneously in dogs after extraction of teeth.

10. The artificially infected extraction wounds which were treated with a mixture of phenol, glycerine, iodine and collodion showed no appreciable difference from those treated with the individual drugs, nor could such a difference be observed between treated and untreated infected wounds.

11. The regeneration of the epithelium is retarded when extraction wounds are packed with a dressing or tampon.

12. It may perhaps be concluded that treatment of dry socket in man is more effective in controlling the subjective symptoms (pain) than in promoting healing.

RELATION OF DENTAL TO MEDICAL HOSPITAL SERVICE*

By LEONARD S. MORVAY,† D.D.S., Newark, N. J.

ACCORDING to the American Hospital Association, only 25 per cent of all hospitals throughout the United States having a bed capacity of 200 or more have a dental service. This figure includes federal and state as well as many private institutions. The conclusion is that, at present, approximately only 250 hospitals have a well-defined dental service.

The history of dental intern service in general hospitals dates as far back as 1910, when the first trial of graduate dentists as members of the staff was found most advantageous. The authorities were slow in accepting this innovation, and few appreciated its value. There are still comparatively few hospitals in the country that endeavor to maintain such a service. It appears that most of these institutions have more vacancies for medical than for dental interns.

The apparent disregard for such a service is very evident. Institutions that are in need of medical interns make exceptional effort in soliciting enrolments and offering pleasant surroundings, tennis courts, pool tables and other features to attract medical graduates to positions. The lack of medical interns often becomes a source of concern to hospital authorities, who sometimes are compelled to resort to advertising in order to ensure uninterrupted medical intern service. Does any one ever find such a contingency in a search for dental interns? In seventeen years of personal observation and study of this condition, perusing dental and medical journals, hospital and institution announcements, etc., I have noted only during the past year a limited effort on the part of hospital executives to prevent vacancies in their dental intern service and then solely through medical journals.

Apparently, during the last two or three years, general hospitals have had a tendency to abolish the dental internship and in its place institute a dental clinic. This leaves the impression that, although a dental service is indispensable, there is perhaps a desire to avoid a close association of dentistry with the field of medicine. Whether or not the average physician fails to realize that the dental graduate of today is better prepared professionally and in his classical background than the medical graduate of ten or fifteen years ago, this fact deserves consideration as the probable cause of this indifferent attitude. It was but a comparatively short time ago that there was little or no premedical education required for entrance to medical schools, and surely medicine is a profession much longer organized than dentistry.

Organized dentistry, on the other hand, has been lacking in acquainting

*Read before the Section on Oral Surgery, Exodontia and Anesthesia at the Seventy-Seventh Annual Session of the American Dental Association, New Orleans, La., Nov. 5, 1935.

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physicians with the progress in raising dental standards; so the responsibility for the condition as it now exists, with the present relationship of the dental service to the general hospital service, is not entirely the fault of our medical colleagues. Present-day dental educational standards will act as an incentive to young graduates to serve in a hospital for at least a year, thus increasing the demand for these positions by dental graduates and by this interest creating the necessity for hospitals to establish dental internships.

STATUS AT HOSPITAL

According to the figures available at this time, the number of hospitals in which there is a regular, defined dental intern service, as classified by states, is as follows:

Connecticut	1
California	3
District of Columbia	3
Illinois	1
Indiana	1
Iowa	1
Kentucky	1
Massachusetts	2
Maryland	3
Michigan	6
Minnesota	5
New York	46
New Jersey	6
Nebraska	1
Ohio	10
Oklahoma	1
Pennsylvania	18
Rhode Island	1
Tennessee	1
Texas	3
Virginia	1

The following list of states shows the number of hospitals offering a bonus ranging from $10 to $50 a month to dental interns:

California	1
Indiana	1
Massachusetts	1
Michigan	3
Nebraska	1
New York	5
New Jersey	3
Ohio	5
Pennsylvania	4
Tennessee	1
Virginia	1[1]

When a patient is admitted to the hospital, the medical intern is immediately summoned to write the history, examine the patient and work up the case for the attending physician. How many times are dental interns asked to assist in an examination? If it is granted that dental foci of infection play an important part as an etiologic factor in disease, why is it not advisable for the executive medical staff to order dental interns to be present during the examination of the patient on admission?

I shall attempt to answer this by raising another question: Why is it that so few dental graduates seek hospital internship? I stress this point owing to the fact that, in the average Class A hospital, the dental department is so overwhelmed with work and the intern so occupied with his specialty that to summon him on the admission of patients is next to impossible. In practical experience, I find that time cannot be spared by the dental intern for this work. If an adequate number of dental interns were appointed, they could be assigned to the various branches of duty, and, in this way, at least one dental intern would be available for the examination of patients on admission. If medical executives were fully to realize the situation, they would make every effort to induce more dental graduates to apply for internship.

The percentage of patients requiring

1. Franken, W. A., and Sauer, G. F.: Should Dentists Have Hospital Internships? J.A.D.A., 19:2203-2211 (Dec.) 1932. Polk's Dental Register, Hospitals with Dental Interns, 1928, pp. 50-51.

dental attention in both medical and surgical wards of Class A hospitals is really alarming. A safe estimate is that 95 per cent of the patients in the wards are in need of dental attention. Of course, this is an arbitrary figure, based solely on personal observation. If we take into consideration the fact that surgical patients should receive thorough prophylactic treatment, we can comprehend the startling percentage quoted. Any one familiar with conditions in the medical wards will concede the correctness of this figure.

during the period of recuperation. This recuperative phase is also applicable to medical cases, not considering the large percentage of systemic conditions directly traceable to dental foci of infection.

Building up the patient's resistance expedites their evacuation from the wards, which, from an economic standpoint, has a tremendous bearing on the hospital service rendered communities. Let us presume that a patient with arthritis is admitted to the medical ward, and, after he has been treated, the acute condition subsides and, within three or four weeks,

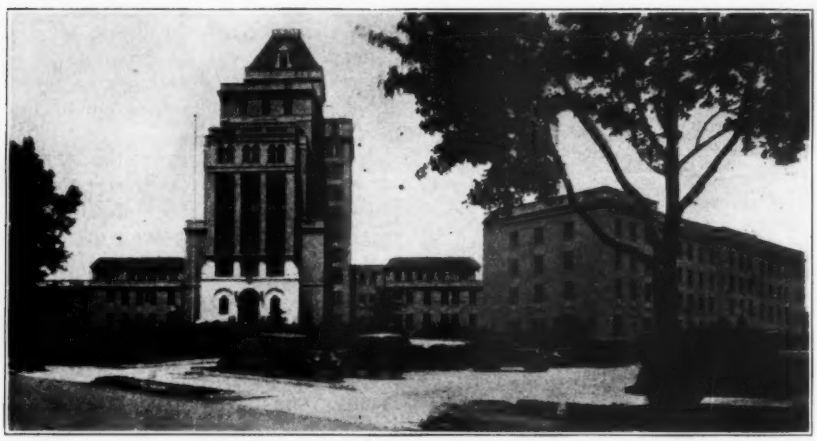

Fig. 1.—Beth Israel Hospital, Newark, N. J.

Even though a definite diagnosis may be made in surgical cases, particularly if they have no relation whatsoever to oral infection, the percentage of postoperative cases of pneumonia can be materially reduced if patients receive adequate prophylactic dental treatment before taking a general anesthetic, thus eliminating calculi, loose bridgework, loose pyorrheic teeth, etc. This procedure would not only help reduce the annoying sequelae of general anesthesia in surgery, but also would build up the patient's resistance

he can be discharged. If the dental foci of infection had been eliminated promptly, the patient might have been dismissed a week or ten days earlier. If this procedure were followed in every case, discharge from the hospital would occur many days in advance of the period now required, and thus the hospital would be saved thousands of dollars in each fiscal year. In an institution of 400 beds, if one week per bed were saved, the reduction of cost would mount to four figures annually, and the authorities

would soon realize that to save many weeks per bed during the year would not be difficult. This is a considerable amount to most hospitals that are running on a deficit, and, for the sake of economy, directors would be obliged to provide dental interns with the facilities extended medical interns. The only additional expense would be maintenance, which would be overcome tenfold by the savings mentioned above. There are also other ways in which a saving as large as this could be used to advantage, i.e., for transfusions, pathologic examinations, special equipment and other therapeutic aids for indigent patients.

The progressive physician has found through practical experience and accepted as a fact that systemic disturbances are often discovered through oral diagnosis. In wards devoted to industrial cases, particularly in cases of lead poisoning, I have observed rapid progress of caries and peridental disturbances. These oral manifestations, the value of which has been ably demonstrated by the experiments of Joseph Aub, of the Harvard School of Public Health, would aid in diagnosis, an earlier discharge from hospital resulting.

Often, a case cannot be properly diagnosed, particularly when there is a question of doubt, without calling in various specialists, such as a rhinologist, cardiologist, roentgenologist or dental surgeon. Dental conditions, in many cases, have been the cause of systemic disorders, which the rhinologist should treat in collaboration with the dental surgeon, as in maxillary sinusitis, traceable to dental infection in many instances.

Only recently, in making my usual semiweekly rounds, I examined, without being called by the medical staff, a ward patient, 15 years of age, with a definite diagnosis of pyelitis. She had had a high temperature for several days before and after admittance. On inquiry, I was informed that a specialist in nearly every medical department represented on the staff had been consulted with the exception of the dental service. In my usual routine examination, I found what was apparently an exceptionally good condition of the teeth and oral cavity, with no teeth missing but the third molars. On close scrutiny a small fissure decay was noted in the lower left first molar, which, at the clinical examination, had not entered as a factor in diagnosis for admission, although focal infection is of utmost importance in these cases. The dental intern was instructed to follow the usual procedure of our service, by ordering a complete dental roentgenographic examination. On viewing the negatives, I found undermined decay with a definite pulp involvement. The tooth in question was extracted, the alveolar process was curetted, and the patient's temperature became normal in a few hours, her improvement resulting in her discharge from hospital within two or three days, and no recurrence of symptoms. After further inquiry, it was concluded that the medical intern, when taking the history and making the examination, had failed, owing to lack of dental training and the absence of a dental intern, to recognize the small fissure caries and therefore had not considered the case from the dental angle.

Among the patients who refuse treatment despite persuasion, detailed explanation and threats of discharge, which seem to have little or no effect, we find about 3 per cent are nevertheless allowed to enjoy the benefit of the general routine of medical treatment, thereby consuming the community funds. Patients should not be allowed to refuse dental treatment and remain at the expense of the institution, when dental infection may be the true cause of their presence in

the hospital. A very definite position should be taken by hospital authorities relative to situations of this character. How long would a hospital tolerate a patient who refused biliary drainage or a barium enema in a case of cholecystitis just because he or she did not care to be annoyed by the inconvenience of the technic employed in the particular treatment essential to the pathologic and roentgenographic study? Unless the patient consented to these procedures, he would be dismissed forthwith. The refusal to undergo dental treatment despite indications of dental infection is regarded by the medical staff with indifference, and no attempt is made to "force the issue."

MANAGEMENT AT THE BETH ISRAEL HOSPITAL

At the Beth Israel Hospital, Newark, N. J., where a service of continuous rounds has been conducted over a period of seventeen years, hundreds of patients have received dental examination. On his rounds twice a week, the dental surgeon was formerly accompanied by a medical intern, but, for the past few years, a regular dental internship having been established, rounds are made with a dental intern. Now the latter, in the presence of the medical intern, makes an examination of ward patients on admission and has knowledge of all new cases. As a result, the dental interns are in possession of the necessary information for old and new cases and can shorten the time required by members of the dental staff in making rounds.

A definite record of examinations that was kept from January, 1925, to September, 1933, shows that 986 patients on the ward service were examined, and in only those cases in which dental infection was suspected as the possible cause of illness. In other words, in fracture cases, definite neoplasms, etc., the dental service did not have adequate facilities to handle the large number of patients requiring care of the gums and teeth, but could manage only those cases in which, according to chart diagnosis, the possible cause of admission was traceable directly or indirectly to dental foci of infection.

Figure 2 shows the chart form used at the Newark Beth Israel Hospital.

In making dental rounds, it has always been my custom to examine only those patients whose condition, in my opinion, might possibly be traceable to dental foci of infection. Thus, the cases in which the greatest service can be rendered are given attention, and wasted effort is reduced to a minimum.

The following tabulation shows the number of cases examined from January, 1925, to September, 1933, not including emergency cases:

Too weak for dental treatment or to be moved for roentgenographic examination, 49.

Actual number of extractions, 188.

Patients refusing treatment, 29.

Discharged before dental treatment was begun or completed, 446.

Follow-up cases, 264.

It can be readily concluded from the number of discharges between the time when roentgenographic examination was ordered and clinical examination completed that many patients were dismissed from the hospital and dental attention was neglected.

Even in the outpatient department, cases are referred to the dental service when they should go to other departments; i.e., cases of glandular involvement, parotitis, frontal and ethmoidal sinusitis and swelling about the maxillae and mandible, which in many instances is edema traceable to tuberculosis, diabetes or syphilis.

In follow-up cases, when patients are

discharged from the hospital before treatment is completed, the social service department is notified to request them to report for a continuation of treatment through the outpatient department, at which time they are given special attention. Precaution is always taken to give this type of patient particular care, as their systemic condition demands conservative treatment. It is imperative that diabetics and patients suffering from cardiac disease, hypertension and other seri-

ORAL SURGICAL SERVICE

Name _____ Ward _____ Hospital No. _____

General Condition of Mouth: _____

Mucous Membrane _____

Gingiva: _____

Tongue: _____

Floor of Mouth: _____

General Conditions of Teeth: _____

Caries: _____ Salivary Calculus: _____

Retained Roots: _____

Involvement of Apical Tissues: _____

Pyorrhea Alveolaris: _____

Salivary Glands: _____

Lymphatic Glands: _____

Miscellaneous Data: _____

_____

_____

Diagnosis _____ Advice: _____

_____

Treatment: _____

_____

_____

_____

Fig. 2.—Chart used at Newark Beth Israel Hospital.

ous systemic conditions be given a minimum amount of surgical care over a specified period.

NEED OF HOSPITAL MEASURES

There is urgent need of equipping surgical departments with facilities for exodontia and minor oral surgery. In large hospitals, there are at least ten or twelve cases a week in the wards requiring immediate oral surgical care, not to mention the number of private patients who could be treated by the dental surgeon, in cooperation with the general surgeons, in small adjoining operating rooms. Under this plan, there would be a closer association between the medical and dental staffs.

Under present conditions, in most instances, patients are taken for treatment in dental clinics to an entirely different part of the hospital, if the institution is progressive enough to be equipped for this particular service. Patients are moved either through the open spaces or the basement, in close contact with ambulatory patients, or, in the clinic proper, via elevators and corridors. Those of us with clinical experience know the type of person who frequents clinics and with whom the hospital patient must rub shoulders, as it were, and appreciate the latter's objections from a social point of view and, more important, realize the health hazard. The tremendous expenditure for sterilization, sanitation and other precautions to prevent patients from developing infection is entirely disregarded when they are conveyed to the dental clinic as described.

The wide demand for dental service is made evident by the extensive research of recent years, which is being continued. The need for additional equipment is substantiated by the observations of workers in this field.

Report of the extensive research work in focal infection by Edward C. Rosenow, of The Mayo Clinic, and his staff demonstrates the selectivity of micro-organisms for certain tissues of the body. This is now accepted as an established fact by many men of both the dental and the medical profession. Additionally, Professor Rosenow found that 61 per cent of all the cases at The Mayo Clinic are the result of oral infection.[2] The important rôle of oral foci of infection in the development of disease and the necessity for their eradication are evident.

Thomas B. Hartzell[3] discovered many years ago that the flora of the mouth are varied and contain at one time or another all the pathogenic bacteria that have been recognized. The mouth is the greatest portal of infection in the human body. Nearly one-half of all the bacteria in the oral cavity belong to the type known as streptococci, and, in dental caries, the micro-organisms have a favorable habitat from which they have ready access to the rest of the body.

Kliger has shown that tooth scrapings from the human healthy mouth contain from 6,000,000 to 8,000,000 bacteria to the milligram and from the diseased mouth, from 600,000,000 to 800,000,000 bacteria to the milligram; about 44 per cent of the micro-organisms being streptococci and from 18 to 22 per cent, staphylococci. The remainder of the flora of the mouth consist of many other organisms: the pneumococcus, the fusiform bacillus and various forms of spirochetes. Under favorable conditions, the streptococcus has a very rapid growth, doubling in number every thirty minutes. The site of most rapid growth is between the teeth, particularly at the gingival

2. Report of Out-Patient, Committee, Am. Hosp. Ass'n Bull., 67, 1926.

3. Hartzell, T. B.: Value, Scope and Expense of Routine Dental Treatment in Hospitals, Mod. Hosp., 7:442-444 (Nov.) 1916.

margin, where they are not disturbed in the mastication of food or in the routine of oral prophylaxis.

When the pulp chambers of these teeth are opened, micro-organisms find their way into the blood stream. If these micro-organisms are left undisturbed, the toxins originating from the streptococci and the staphylococci soon attack the epithelial lining, decomposition of the epithelium, pus formation and, later, entry of the bacteria into the circulation resulting. The decayed tooth with its exposed pulp canal or the imperfectly filled, devitalized tooth acts as a direct avenue of inoculation, conveying bacteria to the circulation and distributing them to such an extent that immunity is broken down. This results in ulcers of the mouth, which become the origin of secondary lesions affecting the lymph nodes, intestinal membrane, heart, joints, brain and liver.

In order to have the needed preventive measures instituted and maintained, the dental profession must equip and support an adequate and efficient dental service with a sufficient number of dental interns as a standard required by the American Hospital Association. Through that organization, this purpose can be accomplished.

EFFECT ON PUBLIC HEALTH

The hospital that gives every patient a complete examination, including the mouth, which carries out the treatment indicated and teaches its nurses the value of such a procedure is an asset to public health.

On leaving the hospital, the patient receiving dental attention recognizes the relation of dental measures to general health, and he returns home with the determination to take better care of the dental structures and surrounding tissues. As he conveys the idea to other members of the family, the benefit to public health becomes progressive.

Dr. Fishbein recently remarked: "There is no other institution of greater importance in the community than the hospital which serves as a health center."

As previously mentioned, it is to the advantage of the physician and dentist to compare observations and findings and to assist each other in the therapeutic care of patients. If a reciprocal attitude were assumed by both professions, conditions would improve, not only in clinical medicine but also in clinical dentistry, to the ultimate benefit of humanity.[4] When the dentist examines the mouth and sees only teeth, and regards them solely as a means of mastication and not in relationship to general health, he is like the physician who treats a local manifestation of a recurrent disease or organic lesion, overlooking the possibility of other foci as the cause of the condition presented.

Similarly, there are members of the medical profession who disregard systemic manifestations that may be traceable to local disorders of the mouth. When the symptoms of systemic infection fail to disappear on the removal of dental foci of infection, the fact that there may be other sources of infection that demand recognition as the cause of systemic disturbance is often ignored. Such complications are often the reason for failure to cure after the removal of but one focus of infection. The body, provided by Nature with defensive forces in its fight against infection, reacts favorably in a condition of multiple foci and, although the resistance is below normal, does not necessarily give any indication of these definite, localized sources of infection.

4. Ziskin, D. E.: Dental Infections: Comparative Systemic Effects of Quantitative Apical Changes, J. D. Res., 11:285-304 (April) 1931.

FACTORS IN SUCCESS

The success of a dental staff does not rest entirely on the activities of the medical staff or on the cooperation of the medical staff with the dental department, but that the dental staff functions as conscientiously and efficiently as the medical staff depends principally on the surveillance of the medical board and director.

The activities of the dental interns should not be confined to the outpatient department, but should be extended to assist the chief of the ward service in diagnosis. This should afford them one year of practical experience and prepare them to analyze their private cases.

As conditions are today, when a dentist is called into an institution and given the privileges of a member of the staff, instead of those patients committed to his care being watched carefully at regular intervals by him, most of them are grossly neglected. This is because the average dentist, unaccustomed to hospital routine, fails to understand the necessity of giving his patients the daily attention required. The office practice in his estimation is far more important.

In the hospital, conditions demanding a specialist's attention depend, in many instances, on more than one member of the medical staff for diagnosis. It is often found that when the condition is traceable to dental infection, the rhinologist cannot successfully treat his patient without consultation with the dentist. Often, a patient suffering from arthritis fails to make a recovery until dental foci have been removed. In cases of fractured extremities in which there has been delay in knitting, recovery is often expedited by the removal of a dental focus of infection, resulting in the building up of the patient's resistance and in the rapid formation of calcium deposits.

As similar conditions arise in all specialties, the need of closer cooperation with our medical colleagues is evident.

There are innumerable cases that demonstrate the value of dental service in a hospital, and the majority of the medical profession as individuals have already recognized the necessity of a dental staff in every hospital. But what definite program has been proposed by the American Hospital Association for its component member hospitals?

The roentgenographic departments of our hospitals, with hardly an exception, know little or nothing about the technic required for the production of a dental negative that will be of practical use to the dental service. It may be said that the majority of dentists realize how unfamiliar our medical confrères are with the principles of occlusion and roentgenographic evidence of dental disease. It is needless to point out how superior a hospital roentgenographic interpretation is as compared with a dental one in fracture cases. It follows that hospital roentgenologists, having unlimited experience in fractures of the extremities, can give invaluable suggestions to the dental staff. But it must be admitted that our hospital surgeons have a limited knowledge of and experience with jaw fractures. Why is it, then, that so many surgeons set these fractures even though competent dental surgeons are available? Is it fair to all concerned?

In my opinion, while it is essential to have a complete dental roentgenographic examination of every patient in the office, this procedure is not always indicated in hospital cases, such as in cancer of the uterus, acute appendicitis or traumatic injuries of the extremities. This unnecessary dental roentgenography involves a great expense to the hospital and is of little value in the type of case specified. If the patient shows poor resistance and delay in recuperating, and a fractured

bone fails to knit, irrespective of what the diagnosis has been a roentgenographic examination and a consultation with the dental department are imperative.

Many years of dental experience are required before the roentgenographic department can really be of assistance to the dental staff in a diagnostic capacity in cases of focal infection. Under the present circumstances, the dental roentgenographic department is necessarily separated from the medical. This should not be, as roentgenology is a common ground, where cooperation can be developed between the dental and medical staffs, and where, at the same time, the medical staff can become acquainted with oral diagnosis by the study of negatives with the dental staff. Through this medium, the two services derive mutual benefit.

Brown[5] has pointed out the advisability of keeping dental and medical services in close contact, thereby according the dental service the recognition that other specialties enjoy.

In ward cases, only that type of dental work should be done that can be completed before the discharge of the patient. In this particular phase of the routine, medical departments have shown little concern as to whether the urgent dental treatment has been completed, before orders are issued for the discharge of the patient. This short-sighted attitude reflects not only the attending physician's ignorance of the part dental foci play in the drama of human ailments, but also his lack of appreciation of hospital economics; for the patient who is discharged while harboring dental infection undoubtedly will be admitted to the hospital again within a short time, even though the original admittance was not traceable to this source.

The dental surgeon in charge of the wards should be widely experienced if unpleasant occurrences are to be avoided. The inexperienced dental surgeon may order a roentgenographic examination for a cardiac patient, and if the condition is critical, the patient may die on the way to the x-ray department. If it is necessary to move a bed-ridden patient, the attending physician should be consulted and the type of examination and treatment contemplated be discussed. This procedure should be followed in all bed-ridden cases, relieving the dental staff of responsibility in the event of a fatality. At the same time, the medical staff will realize that their valued opinion is not disregarded, but their guidance is solicited.

TRAINING OF NURSES

The question of including dentistry in the curriculum of the training school for nurses is pertinent. Few, if any, of the hospitals include in the curriculum what dentists consider the fundamentals of dentistry, with which every graduate nurse should be acquainted. Let us suppose a nurse on duty in a hospital or in a private home finds her patient has an excruciating toothache. If the nurse has not been trained to analyze the cause of this condition, and granting there is no dentist available, the patient must suffer for many hours before trained help is obtained. One unacquainted with such an emergency may say that the nurse could relieve her patient with a sedative or hypodermic injection. Suffice it to say that an overdose of a narcotic may have a serious effect on the patient, for many injections are often required to relieve certain forms of odontalgia. A knowledge of the fundamentals of dental care would enable the nurse to relieve

5. Brown, J. L.: Institutional Policies as Applied to Year's Dental Activities, U. S. Nav. M. Bull., 25:288-300 (April) 1927.

the patient in the average case, in a comparatively short time.

It is an admitted fact that the present curriculum in nurses' training schools is already burdensome and is becoming more so every day. Nevertheless, three or four lectures a year of a half hour's duration would familiarize the student nurse with this phase of her duties. Certain dental structures are included in the discussion of the anatomy of the head by the teaching staff, as given in our training schools; and if courses were given in oral hygiene, regarding the relief of toothache and recognition of symptoms of stomatitis, particularly those of Vincent's infection, the attending physician could be apprized, by the nurse in charge, of conditions which would otherwise often be overlooked. Being in close contact with the patient, the nurse can make proper notations on the patient's chart for the attention of the physician.

After careful consideration and study of the attitude of the graduate nurse and those in training toward the dental surgeon, I have concluded that the estimation in which the dentist is held by the nursing profession, if the truth were known, is much below the regard held for our medical associates; and there must be some reason for it. My deductions are that this attitude toward the dental surgeon, which is also evident outside the hospital, is so conspicuous that it becomes a serious obstacle to dental practice and dental hospital service.

One may say that the situation is exaggerated; but if it is viewed with an unbiased mind, and the attitude of the nurse in the hospital is closely scrutinized, while it may appear on the surface to be one of respect, it truthfully is not. The blame for the condition as it now exists should not be cast on the medical profession, since we have not demanded of hospital educational committees that the student nurse be instructed during training concerning the importance of dentistry in the field of the healing art.

ATTITUDE OF THE PROFESSIONS

The fact that there is a gap between the physician and the dentist cannot be blamed on the physician. Too many of our profession underestimate the breadth of knowledge with which the physician is imbued by his course of training and his clinical experience.

Because the average physician is not familiar with the dental organs and the surrounding tissues and is unable to diagnose dental cases as quickly as the dentist, we belittle his knowledge to such an extent that we seldom call our medical confrères in consultation, taking the stand that they are of no assistance in acute jaw infections. Those of us who, as a matter of routine in our practice, take a physical history of every patient realize the importance of medical advice in dental infections, particularly when complicated with diabetes, arthritis, cardiac disorder or chorea and other diseases. In my estimation, this attitude is comparable to the superiority complex assumed also by some pharmacists, who are naturally more familiar with and better trained in materia medica than are most physicians. The pharmacist too often believes that the medical man is lacking in knowledge of materia medica and prescription writing as compared to one trained in pharmacology. In some cases, on this premise, the pharmacist goes farther than to prescribe and actually gives medical treatment to patrons.

During seventeen years of hospital affiliation, treating diseases of the mouth and acute dental infections, I have learned innumerable methods and technics from members of our medical staff and I am very grateful for the knowledge thus obtained. Training of this kind

emphasizes the necessity for our close association with the medical profession. In no case in which I have been called in consultation has the physician assumed an attitude of superiority. Before the patient is rendered any treatment whatsoever, I have always considered it a duty to call the attending physician and inform him of my observations, showing him this courtesy in recognition of his cooperation.

In hospitals having an active dental service, physicians seldom take arbitrary attitudes in dental cases; whereas, the contrary is true in many instances in private practice. Why is this the case when the majority of ethical physicians are connected with some hospital? If there were a conscientious, progressive dental service in all hospitals, the dentist, when called in consultation or to perform a surgical operation, would not suffer the embarrassment, based on a lack of hospital training, and which is evident to hospital staffs.

CLASSIFICATION OF DENTISTS

Inquiry has been made of the hospitals throughout the United States, the American College of Surgeons, the American Hospital Association and the American Dental Association relative to the classification of dentists on hospital staffs, and it is very evident from the data obtained that this matter has been seriously neglected. Nothing which can be accepted as a standard has ever been attempted by recognized leaders in either profession, but in a haphazard manner we have adopted titles held by various hospital services.

Some hospitals designate those in charge of the ward service as dental surgeons, others as dentists. There has been a distinction made in some institutions between the exodontia and ward service departments in dentistry; while others refuse to place an exodontist in the category of oral surgeon as they require oral surgeons to hold an M.D. degree. Of course, the classification as chief, associate, attending, first and second assistants, etc., has been used. The titles given by one institution are entirely disregarded by another. Does it not seem time for the professions to realize the importance of standardizing dental staffs, that the American Hospital Association may be in a position to make proper classification relative to dental service in hospitals?

PERSONAL ADVANTAGES

The advantages to a dental intern in his association with the hospital are that he becomes more tolerant, happy to serve his fellow man, altruistic and determined to follow a routine with as little waste of time and effort in technical procedure as possible. The effect on him reacts on his future practice and improves it immeasurably. He also receives practical instruction and experience in the pathologic laboratory, which is a continuation of his training in histology. He has the incentive to make slides for himself as an aid to diagnosis and to examine them microscopically in his own office, thus gaining the additional confidence of his patients and improving his own economic status.

The hospital trained dentist treats the patients in his office with a greater sense of responsibility in regard to their physical needs, required medication, etc., than does the average dentist. This experience develops his judgment as to the amount of resistance a patient may have and the maximum treatment which can advisably be given at each sitting. In a cardiac patient, for example, he knows that the use of epinephrine is contraindicated; and that, in diabetic cases, even though the blood sugar may be normal, the condition

of the patient does not warrant the extraction of more than two or three teeth at one sitting, followed by periods of recuperation before further surgical procedure is attempted.

Is there any better medium known to the profession by which a dental graduate can be given this invaluable training than a well-organized modern hospital?

CONCLUSION

I wish to stress that those of us in contact with physicians and recent graduates should make every effort to interest young graduates in dental internship and forcefully impress hospital executives with the necessity for an adequate dental service. This will help to promote cooperation between the physician and the dentist, not only in improving the understanding between the professions but, more important, expediting diagnosis and treatment, and minimizing the suffering of humanity.

ADDITIONAL STUDIES IN THE CLINICAL APPLICATION OF AVAILABLE LOCAL ANESTHETICS*

By RALPH CLARKSON COOLEY, D.D.S., Houston, Texas

THE experimentation and observations outlined in this paper have been intensively and thoughtfully pursued over a period of years in an effort to eliminate the missing links in our chain of anesthetic procedure and technic, also to recall and add to the present knowledge of some of the local anesthetic agents with which we are now reasonably familiar, and to discuss others which have more recently become available.

Fear of the pain of needle punctures on the part of our patients has ample basis in fact and indicates one of the missing links in our technic. Pain following anesthesia is another. The necessity for injecting at subsequent sittings in order to obtain proper cavity toilet and desiccation for cementation in extensive or deep-seated restorations painlessly is another. The control of postoperative pain is another.

These must be eliminated or alleviated before we may be considered sufficiently efficient in the application of our available anesthetic agents, since our patients will continue to credit us with the pain we cause rather than with the pain we relieve.

Timing of anesthesia—its onset, intensity, duration and the period of recovery—is paramount to the timing of our operative procedures, some of which require five minutes or less, while others consume two hours or more. Selection of the anesthetic agent or compound should, therefore, be made with a complete knowledge of its action, together with the purposes that it is expected to fulfil.

Cocaine hydrochloride has been largely superseded as a hypodermically applied anesthetic because of the toxic effects occasionally encountered in certain persons and because of the advent of other drugs that afford satisfactory local anesthesia

*Read before the Section on Operative Dentistry, Materia Medica and Therapeutics at the Seventy-Seventh Annual Session of the American Dental Association, New Orleans, La., Nov. 6, 1935.

without these disadvantageous qualities. It is still the most efficient topical application to the mucous membrane of the nose and mouth.

The proportion of 4 per cent cocaine hydrochloride and 4 per cent phenol crystals, in distilled water, gives us a topical anesthetic that is particularly efficient, germicidal in action, nonescharotic and, in my experience, entirely nontoxic. Applied to the mucous membrane on a pledget of cotton over the point of hypodermic injection, this solution will afford anesthesia of all of these soft tissues, with the exception of the periosteum, in from two to three minutes. When it is then considered advisable to puncture the periosteum, the injection should be made in two steps:

1. The anesthetized mucous membrane should be penetrated with the needle and from 3 to 5 drops of the anesthetic agent should be deposited near the periosteum, the operator being careful not to actually touch it. The needle is then withdrawn and about two minutes allowed to elapse.

2. It is then reintroduced through the same aperture; the periosteum is penetrated, with the needle bevel facing the bone and inserted about 3 mm., and the injection is made.

This procedure is outlined as being particularly applicable to areas over the ten anterior maxillary teeth. It consumes little time considering the comfort given and permits the operator to make a more leisurely final injection, use less anesthetic solution, and more effectively limit the area of anesthesia.

In this connection, permit me to urge that regardless of what syringe the operator utilizes, he eliminate the use of the blunt quarter inch needle, for so many years known as the "dental needle," substituting for it a flexible five-eighths needle of about 24 gage, which he may use as a straight needle or flexed to fulfil an especial purpose or to suit a certain area.

The topical anesthetic mentioned may be very satisfactorily used on the mucous membrane in making the maxillary tuberosity injection, though this injection need not be made in two steps, since penetration of the periosteum is not involved. Likewise, it may be used on the mucous membrane in the mandible, though I have never found it necessary to use a topical anesthetic, nor anything else except ethyl alcohol, prior to the mandibular injection, because of the relative insensibility of the tissues involved in this injection and in this area.

A solution of cocaine hydrochloride and phenol crystals in a 1:100 solution of epinephrine is a most efficient combination to control the serous oozing from gum tissue about prepared teeth. It is nontoxic, germicidal and astringent, and blanches a relatively extensive area. Applied on cotton twine or strands of cotton and wrapped around a prepared tooth which is about to be cemented for a porcelain or gold crown and allowed to remain three minutes, the solution may be removed and the excess washed away with a stream of water. The tissues and prepared tooth may then be dried and cementation proceeded with. The gingivae will remain dry, blanched and anesthetized long after cementation is complete. Its use is likewise indicated before insertion of fillings or inlays involving oozing from gingival tissue. Here, the solution may be packed against the gum on pledgets of cotton, and the subsequent procedure carried out as outlined above.

Use of this solution or combination in this manner is much to be preferred to the application of caustic or escharotic drugs and acids for this purpose, and leaves the soft tissues healthy and uninjured.

Cocaine may not be safely applied to

exposed surfaces of dentin in proximity to the pulp of a tooth and sealed in over a period of hours or days because of its constrictive effect on cell tissues and blood vessels, which tends toward strangulation and devitalization of the pulp.

Procaine has proved itself over a period of more than twenty-five years to be the agent of first choice in solutions for obtaining dental anesthesia by hypodermic injection. It is not to be assumed that better combinations may not be developed nor that a better drug may not be discovered.

Its safety has been phenomenal when we consider its indiscriminate use, the fact that its use is, many times, ill-advised and it is indifferently administered and the great quantities injected at one administration in general surgery. While I have heard it blamed for many things, chief among which perhaps were vasomotor symptoms and shock, these were always traceable to the saline solution or more often to the use of undue amounts of, or unstable or unsterile, epinephrine.

Procaine-hydrochloride in 2 per cent solution with varying amounts of epinephrine, up to 1 drop (solution 1:1,000) to 1 c.c. of a 2 per cent procaine-hydrochloride solution, added for the three-fold purpose of intensifying the anesthesia, localizing and prolonging it, has been used for many years. More recently, stock solutions, dispensed principally in ampules, were introduced. Still more recently, much interesting research has been made in the use of solutions buffered by such alkaline mediums as potassium chlorate or sodium carbonate.

Since the question of timing of anesthesia is involved in the use of these different solutions of procaine, in addition to questions of tissue irritation and postoperative pain, let us consider the p_H (hydrogen-ion concentration) of these solutions as it relates to their clinical application, and especially their onset and duration of anesthesia.

Numerically, a p_H of 7.0 is considered exactly neutral. Higher numbers represent alkalinity, and lower numbers, acidity. Normal blood has a p_H 7.4, and never below 7.

Procaine hydrochloride 2 per cent in Ringer's solution with the addition of 1 drop of epinephrine solution 1:1,000 to each cubic centimeter has a p_H of approximately 5.3. Its onset of anesthesia in the maxilla is from three to five minutes, and its recovery approximately one hour. In the mandibular injection, the onset is from ten to fifteen minutes and recovery two to three hours.

Many commercial anesthetics have been found to have a p_H as low as 3.3, which adds to their stability, but limits their onset of anesthesia and greatly increases their tissue irritation and postoperative pain.

Procaine borate, 2 per cent solution, p_H 8.4, is my choice of the alkaline solutions of procaine. Combined with an epinephrine solution 1:1,000 in the proportion as described with procaine hydrochloride, it obtains anesthesia in the maxilla in from one to three minutes, with a duration of approximately thirty minutes. In the mandibular injection, anesthesia is obtained in from three to five minutes with a duration of only forty-five minutes to an hour.

The active material which produces anesthesia is the procaine base. Until this base is dissociated from its salt, no anesthetic action occurs, and this dissociation takes place much more rapidly in alkaline medium.[1]

The conclusions may then be drawn that:

1. Alkaline solutions of procaine, i.e., those having a p_H of 7.1 or more, are more readily absorbed and render equally

1. Miller, H. C.: Practical Discussion of Block Anesthesia, J.A.D.A., 19:3 (Jan.) 1932.

profound and quicker anesthesia with a correspondingly quick recovery and perhaps less resultant tissue irritation.

2. Slightly acid solutions of procaine, i.e., those having a p_H of 6.9 or less, are more slowly absorbed and render equally profound anesthesia, but with a slower onset, slower recovery and slightly more tissue irritation.

3. Stock solutions and highly acid solutions, i.e., with a p_H of 4.5 or less, are irritating, questionable as to stability and often dangerous, especially when they contain preservatives.

4. The procedure of first choice should be the making up of fresh anesthetic solutions at the immediate time of their employment, this being especially imperative in the case of the alkaline solutions, because of their instability, and the employment of minimum amounts of stable epinephrine.

These conclusions are borne out by the literature, by laboratory experimentation and by clinical application and observation.

Operations in which quick anesthesia is desirable and long duration is not would favor the use of the buffered solutions or of procaine borate; while those operations in which longer duration of anesthesia is required would favor the use of procaine hydrochloride in slightly acid solution. The latter may be further fortified in the matter of duration by the addition of slightly greater amounts of epinephrine and by the addition of slower acting anesthetic agents with slower recovery, provided there is compatibility.

The valuable research of Benedict, Clark and Freeman[2] is commended to you for studious consideration.

Nupercaine, an anesthetic of the quinine series, synthesized by Meischer and reported by Uhlmann in 1929, I have found to be valuable in dentistry. It is said to have an efficiency ten times that of cocaine and forty times that of procaine, though its principal advantage is the longer duration of anesthesia and the fact that its anesthetic effect passes away so slowly that no complaint is made of pain during recovery.

For hypodermic use, nupercaine hydrochloride is usually employed in 1:500 solution in amounts comparable to those of procaine and with the addition of epinephrine, also in like amounts as employed in procaine solution, since the vasodilator effect of nupercaine exceeds even that of procaine. It should be employed in slightly acidified solutions and never in alkaline solutions, since the latter break it up into decomposition products, which might prove dangerous. The duration of anesthesia has been found to be from two to three hours, while mandibular injections have maintained anesthesia as long as eight hours.

I do not agree with Deyton, Wilson and Zaus[3] that nupercaine is more effective topically than cocaine, if it is to be assumed that they refer to its use on the mucosa of the mouth, since the onset of anesthesia is slower, which would be a disadvantage, and tissue recovery is slower, which would add no advantage, though I do agree with their other findings, and especially that "the toxicity of 1:500 solution would be an important factor in infiltrations requiring large amounts of the solution, but not to the dental surgeon who used but 3:5 c.c. of solution."

Since we have found that most anesthesia in the mandible of either long or short duration to the limit of desirability

2. Benedict, H. D.; Clark, S. W., and Freeman, C. W.: Studies in Local Anesthesia, J.A.D.A., 19:2087 (Dec.) 1932.

3. Deyton, C. D.; Wilson, J. W., and Zaus, E. A.: Comparison of Local Effects of Alpha Butyloxycinchoninic Acid-Gamma Diethylethylenediamide ("Nupercaine") with Cocaine and Procaine, J. D. Res., 12:575 (Aug.) 1932.

may be obtained with the procaine solutions, and that anesthesia in the maxilla lasting approximately one hour may be obtained, I employ nupercaine hydrochloride in solution with procaine hydrochloride only for the purpose of obtaining anesthesia of two hours or more in the maxilla for extensive surgical or restorative procedures, and on that small percentage of patients who exhibit a degree of immunity to procaine and in whom only partial or fleeting anesthesia is obtained with procaine solutions alone.

In the absence of a tablet carrying the desired proportions of procaine hydrochloride and nupercaine hydrochloride, my procedure of preparing the solution is as follows:

To 3 c.c. of a freshly made sterile solution of 2 per cent procaine hydrochloride in Ringer's solution is added 5 drops of freshly made sterile solution of 2 per cent nupercaine hydrochloride. This results in a compound solution of 2 per cent procaine hydrochloride and 1:500 nupercaine hydrochloride. To this is added 2 drops of fresh epinephrine solution 1:1,000 and the desired amount of the combined solution is injected as would be procaine solution alone.

The early onset, profound and prolonged anesthesia and comfortable recovery well warrant the procedure.

A combination of nupercaine base 5 per cent in eugenol and including 5 per cent phenol crystals has been one of the most useful and gratifying combinations that I have ever used for direct application to exposed dentin.

It relieves the pain of pulpitis in from three to five minutes, and repeated applications over periods of twenty-four hours have permitted deeper and deeper excavation of sensitive dentin in experimental cases; but its most valuable use has been in applying it, after extensive preparation, to dentin under the temporary fillings, before dismissal of the patient. In from twenty-four to forty-eight hours (no tests were made for a longer period), the dentin was found to be sufficiently desensitized that it could be cleansed and dried with alcohol, with but the very slightest sensation to the patient. Results have been obtained on over 80 per cent of teeth so treated, and it is possible that the other 20 per cent of less favorable results may be attributed to a lack of proper sealing in of the drugs or inaccurate responses from unduly nervous patients.

Cavities in other areas of some of these teeth were still sensitive to the application of an instrument and to cold during the desensitized period of the area treated, which leads me to the conclusion that the entire pulp was not desensitized.

Subsequent reactions of these teeth have been positive to electricity and thermal extremes, and I have no record of a pulp death.

Konrad Szepelski[4] applied a phenol-lanolin (hydrous wood fat) eugenol-nupercaine combination containing 5 per cent of nupercaine to exposed surfaces of vital dentin. He stated that "the applications remained in the cavity twenty-four, forty-eight, seventy-two and ninety-six hours." He adds: "After the lapse of this time, I prepared sections with hematoxylin-eosin staining, which showed all of the tissue intact. Clinical testing (ninety-six hours later) by means of the faradic current showed that the pulp was alive."

Further studies are being pursued with benzocaine, tutocaine, butyn, diothane, pantocaine and other local anesthetic agents to determine clinically what, if any, predominant characteristic of value each may present, but the conclusions are incomplete.

4. Szepelski, Konrad: Nupercaine and Possibilities for Use in Stomatology, Deutsche Monat. f. Zahnheilk., Nov. 17, 1932.

DIET AND PREVENTIVE DENTISTRY*

By CLIFFORD J. BARBORKA, B.S., M.S., Sc.D., M.D., Chicago, Ill.

DIET today is recognized as of great importance in relation to health and disease. A large majority of adult patients who consult physicians and dentists are interested in diet. Food is being recognized as a most important social factor in the life of every human being. Events of today indicate how international relationships are affected by universal dependence on an adequate supply and distribution of food. Medical treatment is resolving itself more and more into modifications of food ingested, and the dental profession's attention has been directed to the possible relation of diet to dental caries. As a matter of fact, the abundance or dearth of food, its cost and distribution, affect indirectly, but intimately, the therapy of every case.

Within the last few years, scientific knowledge of the vitamin content, mineral elements and other constituents of food has increased tremendously. Coincidently with this advance, which has developed a more thorough appreciation of the use of properly selected foods in the promotion of health, the food fakirs, faddists and pseudoscientists, picking out an occasional truth, distort it and broadcast to the unsuspecting public a tremendous volume of misinformation. The public exhibits a surprisingly great concern, in some instances laughable, and in many, tragic, and place diet therapy in the category of patent medicines.

Modern civilization has developed an environment that is altogether too complex for either man's mind or his body. The modern man of today is hopeful of improving on nature through special supplements of this or that food factor, which may be supplied by the extensive artificial preparation and processing to which foods are increasingly subjected. By means of clever propaganda, big business has succeeded in organizing methods for shaping the fundamental instincts of millions of people. The food propaganda is spread over the radio, through magazines, certain newspapers and bill boards, by placing overemphasis on some particular food as necessary to meet the real needs of the body.

Regardless of the fact that we have, in our present day of highly industrialized civilization, a situation wherein, with a wider range of foods to choose from than any people have ever had before, the nutritional conditions and physical vigor of the nation has unquestionably deteriorated. This may be due to the fact that only about 10 per cent of the people of our country earn an income that permits them to eat good, well-selected foods in adequate amounts.[1] It is not surprising that we have poor food habits when we realize that so much food is derived from stale, boxed, dried, canned, bottled oversugared, bleached, highly refined milled foods, even ethylene ripened foods.

The chief characteristics of the average diet may be summed up as follows:

*Read before the Section on Operative Dentistry, Materia Medica and Therapeutics at the Seventy-Seventh Annual Session of the American Dental Association, New Orleans, La., Nov. 5, 1935.

1. Statistics of U. S. Department of Agriculture.

1. Cereals and breadstuffs form a larger part of the diet than ever before, and most of these are consumed in the form of highly milled products.

2. Sugar forms a larger proportion of the diet than previously. During the last century, the consumption of sugar has increased from 8 pounds per capita, in 1823, to 128 pounds, in 1933.

3. More highly refined, canned and preserved foods are used.

4. Meat, dairy products and eggs are used less freely than formerly.

As a result of these facts, the average diet is liable to be deficient in minerals, residue and vitamins.

Another force that influences our food habits is the propagation of erroneous ideas about food. In the field of diet as in that of religion, people seem to cling to their beliefs most tenaciously and to champion them with unreasoning prejudice. Many superstitious beliefs about food have been handed down to us through our ancestors; for example, that lemons and oranges cause "acid stomach"; prunes are a "cure-all" for constipation; raisins are needed by all for iron; onions will cure a cold; celery is a nerve tonic; fish is a brain food; honey and molasses are better for one than cane sugar; milk is fattening and constipating, and certain food combinations are very harmful, such as: lobster and ice cream; milk and cherries or any acid fruit; fruits and starches, and protein-rich foods with starches. Most of these ideas are myths very much like the legend that eating heart made one courageous. There is little or no foundation for the belief in the special efficacy of special foods. The idea of foods reacting in such mysterious ways and forming explosive mixtures is entirely a creation of the lurid imagination of food cultists. There is no scientific foundation whatever for such myths. It is true that overindulgence in any one or more than one group of foods may be harmful under certain conditions.

One would think that with the recent popular rise in interest in psychology, the laymen would begin to realize that such factors as the power of suggestion, the influence of fear and the desire to believe also play a very important part in shaping our beliefs about food. Millions of people suffer from just such inhibitions as to certain foods who could undoubtedly eat those foods, in moderate amounts, if they only thought they could.

The reason for our defective food habits may be summed up in a few words: economic conditions, ignorance, indifference and unfortunate food preferences. Several influences making for improvement in our dietary habits are at work. The foremost of these is education. There seems to be an increased interest in, and appreciation of the importance of, a balanced diet and proper health habits.

In order to formulate proper diets in the treatment of disease, it is first necessary to have a comprehensive grasp of the nutritive principles of diet in health. All the newer knowledge of the nutritive needs of the human body are the result of experimental studies on animals, correlated with the application of these studies to human subjects.

There are certain elements that all diets must possess in order adequately to protect and maintain health. These are: (1) adequate protein; (2) mineral elements; (3) vitamins; (4) sufficient calories for energy requirement, and (5) water.

ADEQUATE PROTEIN

The ingestion of food usually is considered to satisfy two physiologic requirements: (1) to furnish raw material for the growth and repair of body tissues and (2) to furnish energy for the processes of life. For the first purpose, protein alone

will suffice. One of the most confusing problems of nutrition in both health and disease is the question as to what amount of protein is necessary in the diet. Many facts affect the level of protein metabolism and, although opinion varies, we consider 1 gm. for each kilogram of body weight adequate for the average normal adult.

MINERAL ELEMENTS

The hidden mysteries of cell life that are slowly being unraveled are intimately connected with inorganic mineral elements. The body contains about twenty of these elements in appreciable quantities. Adequate amounts are essential. The average dietary is probably more deficient in calcium than in other ingredients. The requirement approximates 0.75 to 1.00 gm., which is the amount contained in 1 liter of milk (1 quart). The daily food of an adult should contain about 15 mg. of iron. Iron is present in lima beans, peas, unmilled wheat, lean beefsteak, spinach, oatmeal, raisins, eggs and green vegetables. The ordinary diet is not deficient in iron. The importance of copper has been realized from the work of investigators of the University of Wisconsin, who believe that deficiency of this element interferes with the assimilation of iron.

The amount of phosphorus required by adults has been estimated to approximate from 1.0 to 1.5 gm. a day. It is essential to the nuclear constituents of blood and lymph plasma. The dietary is often deficient in phosphorus despite its wide distribution as an inorganic element in foods.

In certain areas of endemic colloid goiter, the water and vegetables raised from the soil are deficient in iodine. The normal thyroid gland stores about 25 mg. of iodine. Marine believes that the yearly requirements probably do not exceed 50 mg. In iodine deficiency, this mineral, in the form of iodized salt, may be administered. Plummer gives a few drops of compound solution of iodine once a week, believing that this is adequate. Magnesium, sodium and potassium are usually not lacking in ordinary diets. Probably the chief element to consider in the selection of foodstuffs is calcium.

VITAMINS

Recent investigations, the first full report in 1912, have developed the fact that food of sufficient nutrients, minerals and water is not necessarily adequate to meet all the requirements of nutrition. Thus it appears that certain substances called "vitamins" that are present in the normal dietary in infinitesimal quantities, far too small to yield any contribution to the energy supply of the body or to the bulk as structural elements of the tissues, have great importance in the body's nutritional functions. It is not surprising that nutritional agencies which function in such minute quantities are consumed unconsciously in every adequate diet.

In recent years, much advancement has been made in the knowledge of vitamins, as to both their chemical characteristics and their biologic action. Even though a greater part of this knowledge is the result of animal experimentation, it is now possible to make practical application of it in human nutrition. For many years, it has been known that a prolonged deficiency of certain vitamins in the dietary hinders the growth of young animals and may be the cause of various diseases in adults. Also, certain human diseases are known to be due to the absence of one or other of the vitamins.

The principal functions of vitamins in human nutrition are (1) to promote and maintain health and optimal growth and (2) to prevent or cure deficiency diseases.

A deficiency in intake of one or more

of the vitamins does not always result in a specific disease, but it may bring about changes of specific structure that make for inevitable susceptibility to a latent deficiency disease.

CALORIES SUFFICIENT FOR ENERGY REQUIREMENTS

Sufficient calories for the energy requirements of the body are supplied by food which contains (1) carbohydrates, mostly vegetable in origin, sugars, grains, starches, cereals and fruits; (2) protein, mostly animal in origin, meat, fish, eggs, milk and cheese, and (3) fat, partly vegetable, such as olive oil and cotton-seed

TABLE 1.—SYMPTOMS OF VITAMIN DEFICIENCY; SOURCES OF VITAMINS

Vitamin	Clinical Symptoms of Deficiency or Absence	Found in	Artificial Concentrates
A Anti-infective, fat soluble	Retardation of growth and development, diminished resistance to infection, failure of appetite and digestion, possible sterility due to failure of ovulation, odontoblasts reverting to osteoblasts	Milk, cream, butter, eggs, liver, fruits, green vegetables, such as cabbage, lettuce, peas, carrots, spinach, and tomatoes	Halibut liver oil, cod liver oil, carotene
B_1 (or F) Antineuritic, water soluble (less heat labile)	Impairment or loss of appetite, disturbed digestive processes, impairment of growth in lactation period, possible amenorrhea, beriberi or polyneuritis (nerve disease)	Fresh fruit juices, egg yolks, most vegetables, especially beans, peas, spinach and tomatoes; milk; whole grains or cereals	Brewer's yeast, wheat germ, rice polishings
B_2 (or G) Antipellagric, water soluble (more heat labile)	Pellagra and pellagra-like conditions	Glandular organs, liver, kidney, spleen, lean meats; vegetables, such as beet greens, potato, spinach, turnip, greens; eggs, milk	Brewer's yeast
C Antiscorbutic, water soluble (heat sensitive)	Scurvy, decalcification of bones, decay of teeth, loosening and shedding of teeth	Citrous fruits, such as orange, lemon and lime; raw vegetables, such as tomatoes, lettuce, peas, cabbage and spinach	Orange juice, lemon juice, fresh cortex of suprarenals
D Antirachitic, fat soluble	Rickets (bone disease), faulty absorption of calcium and phosphorus in the body, defects in teeth (caries, poor calcification), general muscular weakness and instability of nervous system	Milk and egg yolks	Cod liver oil, irradiated ergosterol, halibut liver oil
E Antisterility, fat soluble (heat stabile)	Failure in reproduction	Fresh meat; green vegetables; whole wheat; milk fat	Wheat germ oil

The clinical features of deficiency or absence of vitamins, some of their excellent sources and artificial concentrates known thus far are presented for review in Table 1.

oil, and animal, such as butter and lard.

Full appreciation of the importance of the caloric value of foodstuffs dates back to Rubner. Actual determinations in the calorimeter have considerable variations, but for clinical purposes, considering material actually absorbed and utilized, we can use the caloric value of 4 calories for each gram of carbohydrate and protein, and 9 calories for each gram of fat. The number of calories sufficient for the normal healthy adult is dependent on the manner in which each patient reacts to given diet. With the development of the modern machine-age, which has relieved man of hard physical exertion, the demand for a large caloric intake is lessened, but there is a greater need to emphasize the importance of fruits and vegetables, to afford adequate bulk.

Table 2.—Foods That Serve to Meet The Basic Requirements

Milk,	1 pint
Egg,	1
Vegetables,	3 large servings besides potato (one a green leafy vegetable)
Fruit,	2 servings
Meat, fish, fowl,	1 serving (2 ounces)
Butter,	1½ squares (15 gm.)

WATER

The water in the body is derived from three sources: (1) the fluids taken (water, milk, tea, coffee, other beverages and soup); (2) the water contained in solid foods, and (3) the water produced in the body as a result of the oxidative processes of metabolism.

The functions of water are primarily based upon its usefulness as a solvent. It aids the digestive fluids in the absorption of food. It is a valuable adjunct in transporting soluble substances in the blood and lymph. It aids in the excretion of soluble waste products of the body. It keeps the materials in the tissues in solution so that chemical reactions can take place, and also maintains the proper dilution of salts in the tissues. The body temperature is regulated by water. Removal of excess heat is accomplished by evaporation of water from the body surface.

Water is excreted from the body by the kidneys in the urine, by the lungs as water vapor in the expired air and by the skin as sensible and insensible perspiration.

I suggest that from 6 to 8 glasses of water be taken daily. This amount is variable, depending on the fluids ingested from other sources, as well as the activity of the individual and the temperature of the environment. There is no objection

Table 3.—Typical Diet for Average Normal Adult Weighing 150 Pounds*

Breakfast	
Fruit,	1 serving
Cereal (cooked),	⅔ cup
Bacon,	2 slices
Egg,	1
Butter,	2 squares
Cream, 20 per cent,	¼ cup
Sugar,	1 tablespoon
Beverage,	
Luncheon	
Egg (or egg substitute),	1
Potato or substitute,	1 serving
Vegetable,	1 serving
Salad:	
Fresh vegetable,	1 serving
Salad dressing with oil,	1 tablespoon
Bread,	1 slice
Butter,	2 squares
Milk,	1 glass
Fruit,	1 serving
Dinner	
Meat,	1 serving
Potato,	1 serving
Vegetable,	1 serving
Fruit salad,	1 serving
Bread,	1 slice
Butter,	2 squares
Milk,	1 glass
Dessert,	1 serving

*Seventy grams protein, 2,400 calories

to drinking water with meals provided it is not used to wash down the food mechanically. The drinking of large quantities of ice water inhibits digestion and is to be avoided.

ESSENTIALS FOR ALL DIETS

The essentials that all diets must possess, in order to be adequate and to maintain health, have been briefly discussed. In Table 2, foods that serve to meet the basic requirements are listed.

These foods should serve as a basis of all diets, and, if used in the amounts suggested, will be protective and will meet the minimum requirements, except the caloric. They will average approximately 80 gm. of carbohydrate, 45 gm. of protein, 45 gm. of fat and 900 calories.

Additional foods must be chosen to make up the caloric needs, depending on the individual problem.

An example of a typical diet for one day, incorporating the foods that serve to meet the basic requirements, with additional foods added to make up the caloric needs of the average normal adult weighing 150 pounds, is outlined. Whenever additional energy is required, the calories to cover this need may be supplied by simply increasing the amount of fats or carbohydrates, or both.

DIET IN DISEASE

It is only within the last thirty years that diets have been accurately controlled and the quantities of carbohydrate, protein and fat recorded. Even more interesting is the fact that only within the last fifteen years has attention been called to the fatty acid-glucose proportions of the three food elements: carbohydrate, protein and fat. In consequence, it can readily be seen that only today can we begin to consider how best to determine the proper amount of each element in any given intake.

The greatest fault of dietetics today is the attempt to use a stock or printed list for a particular disease for all patients afflicted with the disease, irrespective of the particular needs of the individual patient.

As a simple understanding of the contents of an adequate and protective diet is the foundation for health, individual dietetic education and instruction in measured diets has become the most important and first step in the treatment of an increasing number of disorders. Today, treatment by diet must be considered from three angles: (1) qualitative diets; (2) estimated quantitative diets, and (3) weighed quantitative diets. In the teaching of these methods, an ever-growing part is being played by the well-trained dietitian.

Simple qualitative dietary restriction means just the omission of certain articles of food, such as restriction of sugars and starches in a mild case of diabetes. For moderate reduction of weight in simple obesity, the gross fats and carbohydrates, such as butter, cream, gravies, oil dressing, pastries, table sugar, breads and perhaps even potatoes and rice, should be curtailed. Many patients will derive sufficient relief from such simple omission, finding it unnecessary to go into further details of management.

The distinction between simple qualitative and quantitative diets is not always made clear to the patient. Such distinction must be definitely understood in all cases in which patients fail to be improved by qualitative restrictions within a reasonable length of time, or in those cases in which diet is of paramount importance in relation to the disease.

A quantitative diet is one in which any article of food eaten should be thought of in terms of calories, carbohydrates, protein and fat, and in which the quantitative estimation of these values is impera-

tive. No food should be eaten in unlimited quantities. Any article of food may be eaten provided it contains carbohydrate, protein and fat in amounts that can be incorporated in the total quantity of carbohydrate, protein and fat that is allowed each twenty-four hours and does not displace any of the foods required to make the diet adequate and protective.

A quantitative diet may be estimated in simple household terms such as tablespoonsful, 1 heaping tablespoonful or 2 level tablespoonfuls being equal to 1 ounce. If this method of quantitative restriction is inadequate, one must resort to the use of a weighed quantitative diet. This necessitates the use of food scales and an accurate knowledge of the carbohydrate, protein and fat composition of food. Many patients may feel that this is a difficult task and resent the added work. It is well to caution patients needing quantitative weighed diets that successful dietary treatment cannot be achieved by a month's enthusiastic effort followed by a return to old habits. Success depends on acquiring a thorough knowledge of the fundamentals of dietetics, and, under the physician's guidance and cooperation, developing and maintaining the new dietary habits suitable to their individual needs. When these patients are convinced that a fair trial of weighing food is justified, they are soon astounded to find that weighing food is not so much of a task as they had anticipated. After several weeks, they are able practically to estimate their food proportions by the eye. They learn that the different foods have marked differences in weight and proportion of carbohydrate, protein and fat. Finally, they learn that it is not difficult to juggle figures and make substitutions in the diet to increase its palatability and still keep the diet adequate and protective.

With the foregoing methods of application of diet therapy, in Table 4 an out-

Table 4.—Diseases in Which Diet Is of Paramount Importance

Metabolic diseases:
Diabetes mellitus; gout, overweight—obesity; underweight—malnutrition
Nephritis
Diseases of blood:
Pernicious anemia
Diseases of digestive tract:
Peptic ulcer; constipation
Deficiency diseases:
Food deficiency and chronic disease; nutritional edema; tetany-osteomalacia; pellagra, lack of vitamin B; beriberi, lack of vitamin C; rickets, lack of vitamin D; simple goiter, iodine deficiency

Table 5.—Conditions in Which Diet Is of Varying Importance

Disease of heart and arteries:
Heart; hypertension
Febrile disease:
Typhoid; tuberculosis; pneumonia; other infectious diseases
Diseases of esophagus and stomach:
Gastritis; gastric neurosis; hyperchlorhydria; achlorhydria and achylia; obstructive lesions of esophagus; obstructive lesions of stomach
Diseases of liver and gallbladder:
Cirrhosis (with ascites); jaundice; gallbladder disease
Diseases of the intestine:
Diarrhea; flatulence; fermentation; putrefaction; mucous colitis; ulcerative colitis; diverticulosis and diverticulitis; sprue
Diseases of the blood:
Secondary anemia
Diseases of the urinary tract:
Infections of urinary tract; calculi of urinary tract; oxaluria; phosphaturia
Uraturia
Skin disease
Epilepsy
Migraine
Arthritis
Pregnancy and lactation
Dental caries

line of diseases is presented in which diet is of paramount importance in treatment, and in Table 5, the conditions in which diet is of varying importance.

DIET IN PREVENTIVE DENTISTRY

Numerous studies of average American dietaries have indicated that deficiencies of calcium and vitamins are relatively frequent. Such deficiencies lower the vigor of the body and lessen its ability to resist disease. Dietary deficiencies may have oral manifestations before other conditions are readily detectable. Thus, the dentist has the responsibility of so educating his patients in the elements of dietetics that they may choose their food intelligently.

The dentist's interest should be confined to determining how nearly the patient's daily diet meets the requirements outlined above. If such a study indicates definite deviations from the essentials, the patient should be instructed as to needed adjustments. It is needless to say that when a patient presents one of the many diseases in which diet is of paramount importance, all dietary advice should be supervised by the physician. The dentist is justified in teaching his patients to approximate known standards, for good nutrition is one of the basic rules of hygiene. Nutritional standards can be only approximate or average, for they must allow a certain leeway to compensate for variation both in food composition and in individual utilization of foodstuffs. Variety in the foodstuffs used is more likely to bring about a balanced dietary, yet variety in itself does not necessarily assure adequate nutrition.

One wonders whether there is not a tendency for many investigators to attempt to explain the etiology of caries on the basis of only one or at most two conditions. I question very much whether there ever will be one universal panacea that will prevent or arrest tooth decay or pyorrhea.

During recent years, a great deal of work has been done regarding the relation between diet and dental caries. Many have been too ready to accept conclusions of a nutritional nature as they are published, without regard to the value of the methods used in arriving at such conclusions. Many hypothetical opinions have been expressed on this subject. Various investigators have conducted their research from widely different points of view and have not used the same type of animal for experimentation. This has resulted in many diverse opinions.

Table 6.—Important Possible Factors in Dental Caries

1. Environmental factors:	
	Oral hygiene
	Micro-organisms
	Carbohydrate
	Saliva
2. Nutritional factors:	
	Carbohydrate
	Acid-base balance
	Minerals
	Vitamins
3. Heredity	
4. Age	

Out of the confusing mass of data and reported findings, many different viewpoints, and often diametrically opposing conclusions, have come. It is often very difficult to find any common agreement, or established fact, on the influence of diet as a causative or controling factor in dental disease. Most dentists agree that dental caries is closely associated with diet and that, at the present time, one of the most efficient preventive measures against dental disease known is dietary regulation. Of the many opinions that have been given, I present in Table 6 what seem to be the most important possible factors in dental caries.

CONCLUSIONS

The information accumulated thus far as to the relation of diet and preventive dentistry points to the fact, at least, that an inadequate diet produces nutritional conditions that predispose to dental caries. The knowledge of certain phases of dental caries is still debatable and, in order to have a sane viewpoint, the interrelationship of environmental and nutritional factors rather than any one factor should be emphasized. Until we know the rôle of the many and various food factors as entities in preventive dentistry, we should merely insist that the patient follow the normal well-balanced adequate diet as outlined in this paper.

If any emphasis is to be placed, the patient should be instructed to consume a high mineral, high vitamin and relatively high protein ration that requires vigorous chewing; of low cereal and carbohydrate intake, especially of cane sugar and candy, ending the meal with natural fruits and fruit juices rather than puddings, cakes, pastries and highly sweetened desserts. It is in the eating customs and homemade foods of older times, combined with the sane scientific facts of our newer knowledge of nutrition, that we must seek the foundations of health in the diet of man living in modern civilization.

HOME CARE OF THE INTERPROXIMAL SPACES*

By CLAYTON H. GRACEY, D.D.S., Detroit, Mich.

MORE recent demonstrable advance in the science of oral hygiene or the prevention and treatment of dental disease cannot be attributable to the discovery or promotion of any new or radical procedures surgical, chemical or mechanical. Nor can it be due to the acceptance of any scientific dietary or endocrine therapy. Each day has brought forth its contradiction of yesterday's hope. Obviously, then, we may reason that such advance must be due to a more rational conception and application of the simplest yet unquestionably the most important factor in the promotion of oral hygiene and the stimulation of tissue resistance and regeneration; namely, "home care." Since the advent of the more correctly designed toothbrush and practical plans for its use at home by the patient, the problems of oral hygiene, prevention and treatment have been greatly simplified. And now we believe that another very important step is being taken toward their solution through the more scientific consideration of the home care of the interproximal spaces.

IMPORTANCE OF HOME CARE

Excepting only that rare, self-sufficient mouth which, in the parlance of the sporting world, might be called a "natural," it is necessary for every mouth to have, first, the most careful supervision by the dentist and, secondly, the most meticulous home care by the patient in order that disease, such as caries, periodontoclasia and Vincent's infection, may be prevented. The importance of these two factors in the treatment of perio-

*Read before the Section on Periodontia at the Seventy-Seventh Annual Session of the American Dental Association, New Orleans, La., Nov. 5, 1935.

dontoclasia and Vincent's infection is second only to their importance in the field of prevention. Such a premise has long been accepted. Fallacies lie principally in the degree of thoroughness of such supervision and home care.

Not unlike tissues of the body, those of the mouth require a health supervision and care that is constantly alert to the ever-increasing demands of the biophysical and pathologic expectancies of age. As youth proves quite sufficient, so age proves quite insufficient, dictating always an intensification of oral hygiene.

Since this paper is intended merely to renew our consciousness of the special need of the interproximal spaces, it would seem logical to recall that in these spaces the greatest proportion of caries, the greatest number of pyorrhea pockets and practically all acute cases of Vincent's infection have their inception. On the proximal walls at or under the contact points, bitewing films and explorers are daily disclosing evidence of beginning enamel decalcification and dental caries, in both children and adults. And it is not due alone to an unobstructed line of exposure that the roentgenogram presents more absorption in the interseptal bone than in that of either the buccal or the lingual areas. Pockets in these regions are not only more numerous, but are also more advanced, and their symptoms, inflammation, blood stagnation, hypertrophy and detachment, are more pronounced. Here, too, we find that Vin-

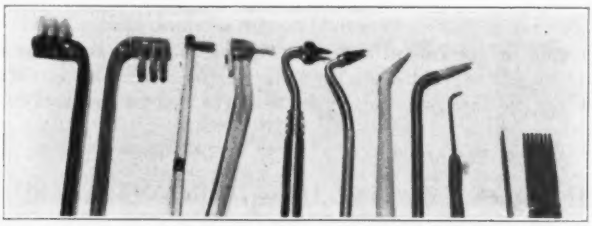

Fig. 1.—Variety of instruments suggested by members of profession for specific care of interproximal spaces.

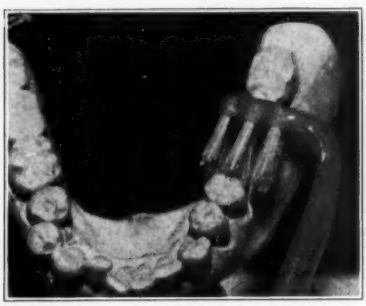

Fig. 2.—Composition handle toothbrush bent to facilitate cleansing and stimulation of distal surfaces and tissues of teeth abutting edentulous areas.

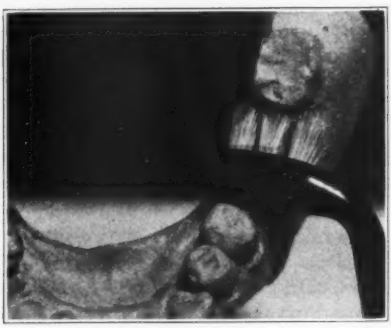

Fig. 3.—Handle bent in opposite direction for mesial areas.

cent's infection, both the acute and the chronic types, evidences a definite proclivity to inception.

Hence, the bulk of correct charting, diagnosis and prognosis is cast on the roentgenographic and clinical picture of the proximal walls, the septal alveolar crest and the tissues that form the structures of the spaces.

What exact influence faulty hygiene might have on the preponderance of caries and periodontal disease in these areas is still to some extent problematic. Certain direct relationships must be acknowledged in view of the following clinical facts: 1. Caries seldom appears on those tooth surfaces that are kept rigidly clean.

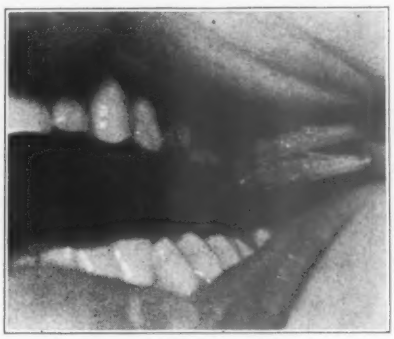

Fig. 4.—Mandible in position to permit brush to reach buccal and distal surfaces of inaccessible molars.

Fig. 5.—Example of areas frequently noted which demand special equipment for their care.

2. Pockets are seldom known to develop on the proximal walls or roots of teeth the soft tissues of which are constantly subjected to the stimulating influence of oral hygiene. 3. Symptoms of progressing pocket formation are reduced and usually disappear under such influence. 4. The interproximal tissues are practically immune to Vincent's infection when their resistance is established by oral hygiene.

If we can admit that dental disease has such a predilection for the interproximal spaces and that oral hygiene is a deterrent to dental disease, it follows logically that procedures in oral hygiene should center on the care of these areas. To paraphrase a timely aphorism: "Take care of the interproximal spaces and the mouth will take care of itself." Not until this thought becomes crystallized will we find a satisfactory response to prophylactic procedures in the prevention of caries or in the prevention and treatment of periodontoclasia and Vincent's infection.

Let us review part of the physical background that might substantiate such a statement.

The enamel walls of the teeth forming the embrasures are more inclined to the gross accumulation of mucin plaques, food débris and waste of the mouth secretions than those parts of the tooth crown that are constantly under the cleansing and polishing influences of the saliva and the ever motile tissues of the cheek and tongue. In spite of the average physiologic hygiene of the mouth, supplemented by an average artificial prophylactic care, there is found in these regions undis-

turbed foreign irritants in varying quantities.

The gingivae, delegated by form and location to protect the most vulnerable of the periodontal tissue relationships, the periodontal membrane attachment, are divided geographically into the buccal, lingual and septal gingivae. Since the protective function of these tissues is primarily to deflect food and prevent its impaction in the cervical crevice and particularly between teeth, the septal portion, lying in the interproximal spaces, should naturally be considered the most significant. The physical environment created by the proximal walls of the teeth, which, even in normal apposition, tend to form a trap for the retention of food and débris, makes these septal tissues dependent for the discharge of their obligation not only on their ability to fill the interproximal spaces but also on the texture and shape of their structure.

Fig. 6.—Decided improvement noted in hygiene and health of interproximal spaces if protected by instruments which pass well into the areas, cleansing approximal tooth surfaces and stimulating soft tissues.

Under ideal conditions, this exacting responsibility is fulfilled very satisfactorily. If all teeth were in normal alinement and foods were of a proper consistency, it would seldom be necessary for outside hygienic influences to be employed; but not often do we find such a combination functioning for the complete protection of these susceptible areas. The anatomic structure of teeth, with their lobular surfaces deflecting food from the crevices and over the gum tissues, should have a protective as well as a stimulating influence. One must but think of their highly specialized end-organ circulation, reacting sensitively to the presence of foreign irritants and inadequate stimulation, to realize the importance of this protection to the gingival tissues. The slightest deviations, so common in the horizontal, perpendicular or lateral relationships, will promote a disturbance in the delicate balance of nature's mechanism.

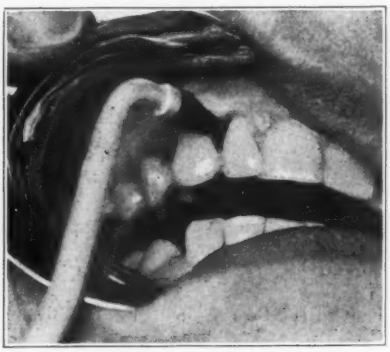

Fig. 7.—Metal handle carrying interchangeable, semihard rubber point placed in position for home care of interproximal spaces.

Further evidence of the weakness of these tissues and their special demands may be found in the localization of the acute Vincent's lesion, which almost invariably first attacks and destroys the crest of the interproximal papillae, and leaves in its wake a battered and extremely mutilated septal tissue.

The dental profession has been alert to this menace and for many years has

accepted, though somewhat casually, the premise that these spaces are most in need of oral hygiene. Irrefutable evidence lies in the history of the toothbrush and tooth brushing. Used primarily to beautify teeth, the toothbrush later became an instrument for the promotion of dental health and, with such recognition, came modifications in its size, design and bristle placement. Such improvements were based chiefly upon an effort to make the bristles more accessible to the interproximal spaces. Then, as symptoms of renewed health appeared, further consideration was given to a more efficient technic or plan with which toothbrushes should be used. As in its design, so in its use, the motivating thought in the improvement of the brush was the proper care of the interproximal space.

The use of dental floss and tapes was introduced to further improve these areas. Thorough and systematic rinsing began to play its part in cleansing and stimulating the tissues.

As dentistry came to a realization that dental disease was constantly present in the interproximal spaces, in spite of these health aids, a more intimate inspection of the walls of teeth and their surrounding tissues brought to light the interesting fact that the toothbrush and the dental floss were often falling far short of meeting their responsibility. Even after very thorough brushing and the use of dental floss, considerable débris could usually be demonstrated, with every evidence of insufficient tissue stimulation. In the light of this conclusion and the more recent knowledge of dental health demands, it was realized that such equipment was not always sufficient to meet the many problems of oral hygiene.

Because of such concrete evidence of the partial ineffectiveness of the toothbrush, several types of supplementary equipment have been brought forward by the profession. (Fig. 1.) Today, many dentists are regularly prescribing, both as a preventive measure and a treatment aid, the use of some special instrument or brush designed to more thoroughly clean the tooth walls of the embrasures and more vigorously stimulate the interlying tissues. Those patients who cooperate to the extent of spending the time and effort required for such special interproximal stimulation are always compensated

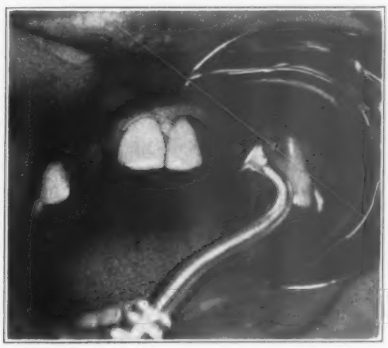

Fig. 8.—More recent design of interdental stimulator.

Fig. 9.—Cotton-wrapped toothpick in holder for interproximal cleansing and stimulation.

through an improvement in the health of the mouth and through many tangible symptoms of heightened resistance.

In presenting a case for such specialized equipment, further evidence of specific demands of the interproximal spaces for cleanliness and stimulation might be considered.

HORNIFICATION[1]

It is known that that part of the mucous membrane surrounding the teeth and forming the gums and interdental papillae has, under normal circumstances, a hornified or keratinized surface. This hornification of the gingival mucosa is an

Fig. 10.—Pointed orangewood carried in tubing, bent for accessibility to various parts of mouth.

essential factor in the maintenance of healthy gingivae. This may be accomplished simply by combining normal dental care with scrupulous cleanliness and rigid stimulation.

POTENTIAL REGENERATION

Dr. Kronfeld has shown, by photomicrographs of several pockets on the septal bone, that the alveolar process involved was in a state of pure osteoclastic resorption. He further contends that the bone underlying a periodontal pocket is not influenced by decalcification, nor is there, at any time, in a true periodontal pocket, necrosis of bone. He states: "The process of bone resorption may be replaced at any time by new bone formation provided the etiologic factor for resorption, namely the progressive inflammation of the overlying tissues, has ceased to act."[2] Such a finding bespeaks, first, an increased mechanical stimulation of the overlying tissues.

ESTHETICS

In a consideration of the esthetic qual-

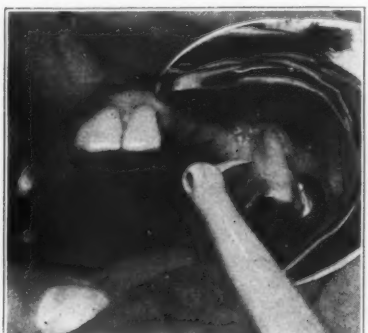

Fig. 11.—Wedge-shaped point, held in holder made of toothbrush handle.

ity of teeth, probably nothing is so essential as the status of the tooth walls bordering the interproximal spaces. Dark stains and accretions on these surfaces destroy the so-called sparkle and beauty of clean, full-rounded teeth.

GAGGING

It has been the unpleasant experience of many patients to find that the brush, when used in certain areas of the mouth,

1. Orban, Balint: Hornification of the Gums, J.A.D.A., 17:1977 (Nov.) 1930.

2. Kronfeld, Rudolf: J. Periodontology, 6:22 (Jan.) 1935.

particularly in the posterior palatine or lower lingual regions, will precipitate a most uncomfortable feeling of "gagging." This nervous condition, which is hard to control, usually concludes with the patient favoring these areas, and results in lack of complete care. Even the size and shape of the small, more scientifically designed toothbrushes will not alleviate this reaction. The advantage of some compact little device over the toothbrush may be visualized if such a device is used for the prophylactic treatment of the interproximal spaces in these regions and also the entire gingiva and neighboring surfaces of the teeth.

PROXIMAL SURFACES OF EDENTULOUS SPACES

Rarely do we find that the proximal surfaces of teeth abutting on edentulous areas are kept clean or their tissues properly stimulated. The reason is quite apparent. In the application of the average toothbrush technic, not specifically planned to care for these areas, the bristles of the brush are literally forced away from these surfaces by the buccal or lingual convexity of the tooth. With no compression from an immediate approximating tooth, there is little if any contact made with the proximal tooth wall or the gingival tissue. Even the thorough flossing of these areas is neglected, patients invariably assuming, unless otherwise advised, that these surfaces, apparently so accessible, are being adequately cleaned and massaged through routine procedures. Special brushes that can be made in the office are often adequate to meet this need. For distal surfaces, such a brush may be made by bending the bristle-holding portion of the brush forward toward the handle and to a point approximately at right angles to it (Fig. 2). For the mesial surfaces, the brush holding portion is bent back on the handle (Fig. 3). Such brushes make it possible to reach practically all tooth walls and tissues abutting on edentulous spaces with accuracy and ease. Only brushes with composition handles may be so conformed by submerging the handle in hot water until it is quite pliable and then bending it forcibly with flat-nosed laboratory pliers held very close to the bristle tufts, the while grasping the handle firmly in the hand.

The more recently invented interproximal prophylactic instruments are found capable of doing this same work well. The curved handle of many designs gives ready access to the proximal surfaces, and, at the same time, sufficient force may be applied to their movement over teeth and tissues for thorough cleaning. They are also adapted for reaching under the inclined surfaces of teeth which have tipped either mesially or distally into edentulous spaces, a wedge-shaped and ofttimes very deep crevice entirely unapproachable by the toothbrush being thus formed.

BUCCOPOSTERIOR MAXILLARY AREAS

Probably the most neglected interproximal spaces are those of the maxillary second and third molars. With some practice and very little effort, these seemingly inaccessible tissues and tooth surfaces may be reached by the toothbrush and other equipment as readily as those in the anterior part of the mouth, and with only an equal limitation. By dropping the mandible into a relaxed position and swinging it outward on the side which is to be brushed, it will be found that a very comfortable avenue of approach has been formed. Through this, the brush may be carried to the buccal and even the distal surfaces of the most remote third molar, by placing the handle cheekward until it takes a position nearly at right angles to the profile (Fig. 4). The lateral movement of the ascending ramus of the man-

dible and the relaxation of the buccal cheek tissues combine to make this opportunity. Some experimentation will be necessary to orient the mandible in both its downward and its outward movement before the maximum space is obtained. Without such help, it is difficult to accomplish prophylactic treatment with any type of equipment in these regions.

PATIENT VARIABLES

Most patients master a carefully taught tooth brushing routine and are able, provided their interest and enthusiasm is sustained, to obtain favorable results. There is a type of patient, which might include both men and women, who, in spite of the most concerted application, both mental and physical, seem to be unable to acquire what often seems a formidable technic of oral hygiene. Though it might appear to be following the path of least resistance, the addition of one of the more practical types of interproximal prophylactic instruments will, to a large extent, overcome such individual shortcomings.

SPECIAL INTERPROXIMAL PROPHYLACTIC EQUIPMENT

Such special equipment for the care of the interproximal spaces is not accepted universally by the dental profession. Many claim it to be unnecessary and feel that use of a toothbrush of correct design, manipulated with a practical technic, plus the use of dental floss, is sufficient to protect the mouth. Others state that mechanical stimulation, overemphasized by such instruments, is potentially more injurious than beneficial to those sensitive tissues. Still others assert that it is an imposition to ask a patient to add to an armamentarium the efficient use of which already taxes their patience and enthusiasm.

In refuting these claims in general rather than specifically, I can only state, empirically, that my personal experience and that of many dentists, with whom I have discussed this problem, leads me to believe that the more intensive hygiene of the interproximal spaces, through the medium of specialized prophylactic devices, is, in many cases, proving to be a very necessary factor both in the prevention of caries and in the prevention and treatment of periodontal disease. I have yet to find a single instance in which a patient, when properly instructed, has not been able to improve the health conditions of the mouth over those that were present when controlled by the toothbrush and dental floss alone. Those regions of the mouth that had been particularly inaccessible and were seldom satisfactorily responsive to even the most intensive use of the toothbrush (Fig. 5) have shown almost immediate improvement—an improvement almost as startling as that following a thorough prophylactic treatment in the dental office.

Inflammation, chronic in many instances, has been noted to recede and color improvement to appear at once. Hypertrophied gum tissue assumes a more normal condition and resorption of pocket forming tissue is expedited (Fig. 6). Tooth surfaces that had been constantly covered with stains, heavy mucous plaques and mouth débris are immeasureably cleaner under their influence.

It was quite recently that the first instrument thus designed for the specific care of the interproximal spaces was suggested to the dental profession. For years, some periodontists and others interested in the care of the periodontal tissues, have, for want of something more practical, been recommending to their patients the use of ordinary round toothpicks. Results from such additional stimulation and cleansing had been so unsatisfactory that the need for a more prac-

tical device and one which could be recommended with greater safety has long been felt.

TYPES OF EQUIPMENT

Brush bristles, and nonirritating materials such as rubber, soft tropical wood and cotton, and even metals are used in the various instruments that have been designed. The points are usually round or triangular.

I have found that an instrument composed of a short, serrated handle, carrying a small interchangeable triangular semihard rubber point, quite completely fills the need (Fig. 7). This requires little instruction in its use, is quite harmless and provides a medium both for cleansing the interproximal walls of the teeth and for stimulating the soft tissues of the interproximal space. It is readily cleansed, very durable and compact in size and shape. Changes in this design have already been affected (Fig. 8).

Considerable interest is evidenced today in a soft nonfibrous tropical wood point, in general shaped and used very much like a toothpick. This is treated with a germicide and shaped to permit it to pass between the teeth and compress the soft tissues, a very satisfactory, though somewhat unexplainable, feeling of well-being in the tissues remaining after its use.

Still another type is based upon the theory that the use of cotton wrapped about the end of a fore-shortened round toothpick, carried in a specially designed handle, will promote interproximal hygiene with less danger and greater efficiency than use of the toothpick alone (Fig. 9).

Dr. Charters recommends the use of No. 14 or 18 gage wire, of silver, composition, copper or gold, which is bent for accessibility with the end pointed and highly polished. Although capable of compressing soft tissues for stimulation, such an instrument, it seems, would be less cleansing than would softer materials and could not be recommended for the latter purpose.

A brush carrying one tuft of bristles on either end of a long slender handle was planned several years ago by Dr. Chichester. This was an initial step in the right direction, though less practical than certain brushes later suggested.

Brushes of various sizes and shapes with handles designed to make them more practical for unusual problems can be purchased or often, as heretofore suggested, be made to fit the individual needs.

Orangewood sticks can be pointed in a pencil sharpener and boiled and bent to any desired angle or may be cut off at desired lengths and placed in the end of a small piece of metal tubing, which may, in turn, be bent to any angle (Fig. 10).

Small porte polishers can be carved from toothbrush handles with little practice and, with orangewood points, wedge-shaped or round, can be placed in the hands of the patient with instructions for their use (Fig. 11).

The use of lock pliers and cotton pellets has its place in certain conditions.

These suggestions from within and without the profession are presented with the hope that some will be found helpful.

At least a great want is being partly satisfied with the opportunity to place in the hands of our patients better working tools, to combat the forces militating against oral health.

Though recognizing the responsibility as one to be divided between patient and dentist, we must first accept our obligation to promote oral hygiene. Every opportunity to suggest better methods, to modernize the application of mechanical therapy and to maintain the patient's interest and enthusiasm must be improved.

With a full appreciation of such influences, dentistry cannot let up in its search for more pertinent oral hygiene measures. "The shadow must not be accepted for the substance."

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SAFEGUARDING THE FOUNDATION*

By C. N. JOHNSON, D.D.S., L.D.S., Chicago, Ill.

So much has already been said about the growing importance of attention to the supporting structures of the teeth that it would seem almost superfluous to again call attention to the subject at this time. But what are we to do about it? Despite all of the admonition that has been given by some of our foremost practitioners, the neglect that is apparent on every hand stands against us as a profession and challenges our reputation as a body of men and women having at heart the best interests of the people that we are supposed to serve.

One of the most pernicious doctrines that have ever been advanced has become currently prevalent to the effect that diseases of the supporting structures of the teeth are not amenable to treatment. It has become almost a shibboleth to announce that "pyorrhea cannot be cured." This nonchalant disposition of the question has been permitted to pass muster as established doctrine altogether too long, and it has resulted in the needless loss of numberless useful and serviceable teeth. Why so many practitioners have virtually thrown up their hands in the face of this disease and let the case go by default is beyond comprehension.

We have heard some of our most conservative and thoughtful men argue in clarion tones against the extraction of teeth merely because there was approaching dissolution of the tissues around them and the reason for this protest is that these men know only too well that there is no justification for the loss of many of these teeth. They have in their practices preserved altogether too many of them to sit idly by and longer sanction the policy of *laissez faire*.

Let us discuss the attitude of many of our profession the moment the least impairment takes place in the gingival tissues. For some reason, there seems to be a most unaccountable indifference to the onset of gingival irritation, and the anomaly is presented that, in the first instance, when the affection begins, little attention is paid to it, as if it were of no consequence whatever, and the moment the disease is recognized at all, the profession immediately throws up its hands in despair and assumes that it cannot be cured at all. The lack of logic in such an attitude as this is one of the most incomprehensible manifestations of our professional experience, yet it is something that confronts us every day of our lives.

If we wished to be hypercritical, or if we were disposed to be improperly lacking in dignified expression, we might with justification exclaim: "What is the matter with the profession?" Surely

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after all these years of wrestling with this problem, and after all of the admonitions of some of our leading practitioners, the public is entitled to something better in the way of protection than they are receiving today.

In the first place, the profession should be more alert to the manifestations of approaching gingival disturbance. The least indication of irritation or congestion should be recognized at once and the cause sought and corrected. It is usually a simple matter to do this in the beginning, and to the great benefit of the patient and the corresponding satisfaction of the operator. In no department of our service, not even in the progress of dental caries, is the old adage more applicable than in this that "a stitch in time saves nine." True it is that, in too many instances, the case does not come to the practitioner in time for the most effective management, but patients should be constantly schooled in the necessity for early and regular supervision. Emphasis should invariably be given the statement that the care of the gums is essential, as much so as is care of the teeth. This should not be a difficult lesson to impart in view of the numerous examples everywhere of the loss of teeth from loosening.

But, at this point, we should stop short and not convey the impression that a little loosening of the teeth is fatal. Just because we are solicitous in our efforts to avoid trouble of the gums, knowing the consequent tendency to loosen the teeth, there is no justification for capitulation the moment the least loosening begins. The time of all others to bring disease under control is, of course, in its incipiency, but this does not mean that we must stand helpless even though the disease has taken definite hold. We do not despair if we find a carious cavity in a tooth, even a large cavity: we apply ourselves all the more vigorously to its cure. We recognize the patent fact, of course, that it is easier to control and cure a small cavity than it is an extensive cavity, but, as long as the foundations are secure and the tooth is firm, we know that there is always some way whereby we may save the tooth without extraction. Let us assume a similar attitude of conservatism when the supporting tissues are attacked.

There has grown up in recent times, particularly since the theory of focal infection has gained such sway, and since denture work, both partial and full, began to hold such fascination for the profession and the people, an altogether unwarranted tendency to sacrifice the natural teeth. Unquestionably, teeth must at times be lost, but there is no possible warrant for the loss of so many teeth as we see taken out today. If dentistry holds no greater achievement than to extract the natural teeth and supply artificial substitutes, our profession has not gained much ascendancy as a scientific and cultured calling, and the moment we yield to the temptation to take a short cut and travel along the lines of least resistance through the medium of exodontia, we straightway begin to deteriorate in professional skill and in prestige among thinking and discriminating people.

All honor to the fine body of men and women who are devoting their best energies to the treatment of these diseases that are attacking the foundation on which the teeth are supported. They are doing a most laudable work in rescuing many useful teeth from destruction, and we trust that their numbers and their influence may increase.

It is high time that propaganda to the effect that "pyorrhea cannot be cured" be assailed in no uncertain terms. By whatever name we may choose to call it, this disease holds rank as a major menace unless it is combated in the proper spirit

and with serious intent; but if it is approached with devotion and intelligence, there is no reason that it cannot be brought under control the same as other diseases.

But this brings up the pointed fact that pyorrhea seldom or never cures itself. Certain diseases of the human body run their course and of their own accord subside and give no further trouble, but it seems to be the fate of the dentist to deal with affections that go steadily on to the destruction of the tissues unless checked by the skill of the operator and the cooperation of the patient. Without interference, dental caries goes progressively forward to the bitter end, and the same may usually be said of those diseases that attack the supporting structures.

It is therefore the prime function of the dentist to have such close supervision over the dental tissues that disease is recognized in its incipiency and brought under control by treatment. In a general way, we have made commendable efforts at checking dental caries by filling, and it now remains for us to exhibit the same enthusiasm and application to the task of treating pyorrhea. And be it said that this is not by any means so hopeless a task as it is usually represented to be.

The object of this paper is not to deal technically with the detailed treatment of pyorrhea, but merely to touch here and there on certain of its manifestations. And here we are confronted at the outset with the fact that injury to the supporting tissues is not always caused by the same thing. To manage this affection, recognition should be given to this fact, for the reason that logical treatment should be directed toward the specific cause.

These causes have so frequently been enumerated that it is quite unnecessary to discuss them here except to refer in a brief way to certain of the different lines of treatment as indicated by the particular cause. We know that any kind of irritation to the tissues prolonged for a sufficient period of time must inevitably lead to an impairment of the supporting structures; and it matters not what causes the irritation, the result is the same.

It may be the presence of calcareous deposits around the teeth, food wedging between the teeth from faulty contacts or rough overhanging margins of fillings or any departure from a smooth surface on the necks of the teeth. Gum tissue will not heal perfectly or remain healthy in contact with roughened tooth surfaces. This is a cardinal fact for the practitioner to remember, whether he is engaged in special work or in general practice.

Another cause for loosening of the teeth may be found in faulty occlusion. The traumatism caused by the presence of malposed teeth will soon affect the pericemental membrane and lead to disease, and this fact is so apparent that the indifference of many in the profession to disturbances of occlusion is inconceivable. Remedying the occlusion and preventing undue or unnatural stress on the teeth are sometimes the only measures that are necessary to bring about a complete cure of pyorrhea, unless there are other ulterior agencies at work to complicate matters.

To safeguard the tissues surrounding the teeth, the operator must have a keen observation of every possible manifestation that tends in any way to interfere with proper function. And this recalls once more the different causes of pyorrhea. It is not always the irritation of calculus or faulty restorative operations or the wedging of food, and it is not always faulty occlusion. It is true that these are the major causes of this disease, and we have evidence to that effect.

We know that there are many cases that respond promptly to the thorough

removal of irritating agents. To clean a tooth completely of calculus and smooth the tooth surface will often bring about a cure, and, what is quite significant, it will bring it about without medication. In fact, manipulation without medication is, many times, more effective than medication without manipulation. All of the medication in the world will not bring about a cure as long as the irritating agencies are present. We know that when we remedy a faulty contact between the proximal surfaces and thus prevent the lodgment of food in the interproximal space, we often thereby eliminate a pyorrhea pocket. We know that frequently, if we correct an abnormal occlusion and relieve undue stress on the membranes, Nature will repair the damage and bring about recovery.

We know these things because we have so often seen them occur in practice. They are demonstrated facts in the experience of many men and women in dentistry, and they cannot be gainsaid any more than we can question the fact that filling a cavity in a tooth will stop the decay and frequently preserve the tooth for a lifetime. If these things were not demonstrated facts, it would be a serious reflection on the efficiency of dental practice, and there would be little justification for the claim that we are a scientific profession. These undoubted demonstrations form the basis for the contention that we are a utilitarian calling, and of definite and concrete benefit to the human race. To question them would be equal to contending that fire will not burn, or that water will flow up hill.

Every day of our professional lives, we see these things demonstrated, and thus we are led to marvel at the fallacious doctrine that these diseases of the supporting structures cannot be cured. It is one of the most inconceivable things in professional experience that this iconoclastic doctrine should have gained such sway in our profession, and the unfortunate thing is that this fallacy has in too many instances been passed on to our patients. Any propaganda that reflects on the efficacy of dental service is an injustice to dentistry, and of undoubted damage to the people. Every dentist worthy of the name should uphold the honor and good repute of the profession in every legitimate way, and any man who cannot find it in his heart to justify dental service as based on past experience and the traditions of the craft is unworthy of the confidence or endorsement of either the profession or the public. The fact that an operator has not been successful in his treatment of these cases does not warrant him in spreading the propaganda that it is futile to treat them. Better be honest and turn such cases over to some one who can and will treat them.

In all of this, there is no intimation that every case of pyorrhea can be cured. We are seldom 100 per cent successful in anything that we undertake, and there are certain cases that come to us in such a condition that nothing can save the teeth short of a miraculous regeneration of tissue, which is ordinarily beyond our dispensation. We should recognize this fact and be frank about it, but this does not warrant us in throwing up our hands in every case and consigning the teeth to the forceps. There is no case in the ordinary category that cannot be immeasurably improved by treatment even though some of them may be too far gone to be completely cured. At least in every ordinary case, the flow of pus can be stopped, and the mouth to that extent be made healthier. Sometimes, for one reason or another, it is a decided advantage to clean up a mouth in this way and retain the teeth temporarily, even though it is certain that they must ultimately be lost.

This, of course, is only in the event of some emergency, the truth being that, ordinarily, if a case has been permitted to go so far that there is no possible hope of saving the teeth, the sooner they are out the better.

There is one condition to which I particularly wish to call attention at this time. I feel that it has not been given the attention it deserves, and I cannot help feeling that it is accountable for some of the skepticism that has grown up around this question. We see certain cases (fortunately, they are relatively rare) in which all of the ordinary causes are absent, yet the teeth strangely persist in becoming loose. There may be no calcareous deposit, and no apparent local irritant of any kind. There are no indications of inflammation, no swelling of the gums, no flow of pus and none of the ordinary symptoms of a typical pyorrhea, yet there is a general loosening of the teeth that is most baffling.

Here is unquestionably a condition of systemic origin, and the usual local treatment avails us little. If the dental operator encounters a case of this kind and, failing to recognize it, merely begins to institute the usual local treatment, it is little wonder that he immediately jumps to the conclusion that "pyorrhea cannot be cured." Assuredly, local aid is not the solution of the trouble, and the case should at once be referred to the family physician with a frank statement of the local manifestations and an appeal for a systemic check-up. It is here that there is the most vital need for a cordial cooperation between the physician and the dentist. Team work is indicated here if ever, with, it seems to me, the major responsibility on the physician. The reason for this statement is the manifest fact that there is something beyond a local cause for the trouble, and the suspicion should at once be aroused that if the pericemental membranes are so profoundly affected, there is little reason to doubt that other and more vital organs of the body may be similarly involved. An observant dentist may thus be the means of directing the physician's attention to a study that may disclose a latent affection that otherwise would not have been detected till serious consequences were imminent. In fact, I cannot escape the conviction that, in many instances, the manifestations in the mouth are a more accurate index to systemic conditions than we are inclined to believe, and that the dentist has unusual opportunities to be of signal service to the physician in this particular. It therefore behooves every dentist to school himself in a study of the manifestations in the mouth, to the end that he may be enabled to detect anything of an abnormal nature the moment it appears; and, to carry the idea further, it should not be considered beyond the bounds of reason to suppose that an observant dentist should be able to diagnose most of the affections that occur in the mouth. Frequently, the dentist is given an opportunity to observe conditions in the mouth and anticipate an approaching disease long before the physician would even see the case in the ordinary course of his work, and it is the duty of the dentist to safeguard the patient and assist the physician by an alert observation of conditions in the mouths of all of those who come under his care.

The dental operator who merely confines his attention to a cavity in a tooth, and contents himself with inserting a few fillings and lets it go at that, is not practicing his profession in the most efficient manner, any more than would a machinist be doing his full duty if he undertook to make the best machine in the world and ended by leaving out certain of the essential parts.

In this machine of ours called the human body, there is ample opportunity for all kinds of complications, and it should be the function of all of those who are in any way concerned in the care of the machine to use their utmost endeavor toward keeping it in the best condition. And, in this laudable effort, no one service is worthy of greater consideration than that of maintaining the tissues around the teeth in a state of health and efficiency.

To revert once more to the statement that more teeth are lost from a failure of the supporting structures than from dental decay, the assertion is here unreservedly made that this wholesale loss of so many teeth is unnecessary. The great majority of these teeth might be saved with a little conscientious care on the part of the profession and reasonable cooperation on the part of the people. In this dual responsibility, the chief burden of obligation should fall on the profession. That people are sometimes indifferent or neglectful or fail to cooperate is largely due to the fact that they have been encouraged, if not directly schooled, in the idea that it is futile to try to preserve the teeth. The people for the most part receive their impressions regarding the teeth from the profession, and therefore there is a responsibility involved in dental practice aside from the proper technical treatment to be given the teeth, the responsibility of constantly imparting the proper kind of instruction to the patient, to the end that his best interests shall always be conserved.

That people are indifferent or careless about their teeth is usually due to one of two things, the fact that the profession has failed to impress them with the importance of the teeth, or that, when they have attempted to conserve the teeth, they have not received the cooperation of the profession in the way of attention or expert treatment. Of course, there is always a large element among the public who have little concern about their own physical welfare, and whose natural indifference constitutes one of the greatest handicaps for the professional man to overcome; but, in this instance, we are attempting to deal with persons who are anxious to have their teeth saved and who are willing to cooperate to the best of their ability and convictions.

It is to the service of these persons that members of the profession are under the greatest obligation to whole-heartedly devote their best energies, and if we study the records of the most conscientious men in the profession, we shall find ample justification for the faith that is in us when we assert that most natural teeth can be saved with proper care.

And in consonance with this idea, and to conform with the major premise of the present paper, the fact must be emphasized, in pursuance of this conviction, that we have to deal primarily with the problem of maintaining the supporting structures of the teeth in a condition of health and longevity. It matters little what attention we give to the crowns of the teeth in the way of filling, if the tissues around the roots are not kept normal. Thus, our chief concern in the very important problem of preserving the natural teeth is to "safeguard the foundation."

POTENTIAL DIFFERENCE BETWEEN VARIOUS KINDS OF METALS APPLIED IN ORAL CAVITY AND THEIR PHYSIOLOGIC EFFECTS*

By EIJIRO WAKAI, M.D., Tokyo, Japan

IT is a well known fact in science that when two different kinds of metals are placed in contact with each other or are in contact through an electrolytic medium, there is potential difference. Close observations on this particular fact were recorded in 1925 by Shirokuro Endo, using the various metals that are generally made use of in dentistry. Also, a clinical report of various cases of physiologic disturbance in the human body due to the presence of different kinds of metals in the oral cavity was published by Everett S. Lain. But as yet nothing definite has been determined as to what reaction is produced in the general system by this potential difference.

The following experiments and observations were made on this particular problem by me, for the results of which I am indebted to Dr. M. Okada, and Dr. Kato, professor of physiology.

Details of the experiments are given below. The materials used were: precious metals, nine; dental alloys, twenty-four; dental amalgams, eight.

Potential differences in the foregoing experiments were recorded according to the compensation method of Poggendolf. The muscle-nerve system of the Japanese common toad was made use of in the stimulation experiments. An extracted human tooth was employed, in which an inlay had been placed, and the potential difference in it was recorded.

Experiment 1. A small quantity of Ringer's solution for cold blooded animals was taken in a beaker and two well polished plates, one each of zinc and copper, were placed in it vertically, side by side, and parallel. In between the plates was placed the potential difference recorder, and the results were noted.

This experiment was repeated a number of times, each time a different metal being used in place of copper, with zinc. The observations are given in the accompanying table.

Experiment 2. A small quantity of Ringer's solution for warm blooded animals was taken in a beaker and the same series of experiments were conducted, the results of which are also recorded in the table.

Experiment 3. The same series of experiments as in Experiments 1 and 2 were conducted in the human mouth and the recordings made. Results are shown in the table, under a separate heading.

Experiment 4. (Stimulation, using the muscle-nerve preparation.) In place of Ringer's solution, used in the foregoing experiments, the muscle-nerve preparation of the common toad was used. Stimulation effect in the muscle, nerve, etc., was recorded and is given in the column under the same heading.

++ means that strong muscular contractions were evidenced; +, that fair

*Igakuhakushi Dental Department (director, Mitsuru Okada), Keiö University Medical College.

Combination of Metals Zinc and:	Potential Difference (Volts) 15 C.			Effect of Stimulation*		
	In Ringer's Solution for Cold-Blooded Animal	In Ringer's Solution for Warm-Blooded Animal	In the Oral Cavity	Tongue	Nerve	Muscle
Platinum	1.11	1.10	0.98	+ +	+ +	+ +
Pure gold	1.14	1.02	0.97	+ +	+ +	+ +
22-K. gold	1.06	1.01	0.95	+ +	+ +	+ +
22-K. gold (cast)	0.99		0.93			
20-K. gold	1.02	1.01	0.90	+ +	+ +	+ +
18-K. gold	0.96	1.02	0.92	+ +	+ +	+ +
No. 3 iridio-platinum-gold (Dr. Okada's Rp.)	1.05	1.01	0.94	+ +	+ +	+ +
No. 2 iridio-platinum-gold (Dr. Okada's Rp.)	0.99	1.02	0.95	+ +	+ +	+ +
18-K. gold solder	1.02	1.00	0.87	+ +	+ +	+ +
16-K. gold solder	0.98	1.00	0.89	+ +	+ +	+ +
New white gold†	0.95	0.96	0.91	+ +	+ +	+ +
Wipla	0.84	0.85	0.76	+ +	+ +	+ +
Neoplatina†	0.84	0.82	0.79	+	+ +	+
Glory platina†	0.81	0.78	0.76	+	+ +	+
Sunplatina†	0.81	0.79	0.79	+	+ +	+ +
Platinoid	0.84	0.86	0.81	+	+ +	+ +
German silver	0.81	0.90	0.78	+	+ +	+ +
Copper	0.87	0.86	0.78	+ +	+ +	+ +
Silver			0.89			
Silver solder, hard			0.87			
Silver solder, soft			0.86			
Randolph gold	0.86	0.87	0.84	+ +	+ +	+ +
Sion gold†	0.85	0.86	0.81	+	+ +	+ +
King gold†	0.84	0.85	0.78	+ +	+ +	+ +
Century gold†	0.83	0.83	0.76	+	+ +	+ +
Samson gold†	0.82	0.82	0.82	+	+ +	+ +
Weston metal	0.58		0.40	±	+ +	+
Aluminum	0.02	0.02	0.09	—	—	—
Orden (cast)†	0.83	0.84	0.81	+ +	+ +	+ +
Sion gold (cast)†	0.83	0.84	0.81	+ +	+ +	+ +
Everest gold†	0.82	0.82	0.81	+ +	+ +	+ +
Acolite	0.52	0.56	0.43	+ +	+ +	+
Triolite†	0.52	0.57	0.42	+	+ +	+ +
Castal†	0.52	0.57	0.43	+	+ +	+ +
Twentieth century amalgam alloy	0.62	0.59	0.44	±	+ +	+ +
Copper amalgam	0.85	0.84	0.87	+ +	+ +	+
Silver amalgam alloy	0.52	0.53	0.37	+ +	+ +	+ +
Bright amalgam alloy†	0.61	0.62	0.57	+	+ +	+ +
Townsend amalgam alloy	0.57	0.56	0.43	+	+ +	+ +
Accurate amalgam alloy	0.51	0.52	0.38	+	+ +	+ +
Morita amalgam alloy†	0.11	0.12	0.05	—	—	—
Shyofu amalgam alloy†	0.53	0.52	0.54	+	+ +	+ +

†Special dental alloy made in Japan.

*++, strong stimulus; +, medium stimulus; ±, weak varying stimulus; —, no effect.

muscular contractions were present; ±, that sometimes contractions were noted, at other times not, and — means no muscular contractions were noticed whatsoever.

Experiment 5. (Stimulation experiment on the tip of the human tongue.) In the same way as in the previous experiment, various metals were placed side by side in pairs, on the tip of the human tongue and the reactions produced by their presence, noted. These are given in the table.

Experiment 6. (Effect on dental tissues.) An extracted human tooth was taken and an excavation made in it. The cavity was filled with cement and inlay, the head of the latter projecting above the level of the cement as a needle-like projection. The metal parts were all coated with pure paraffin, for insulation. (Fig. 2.) In a beaker, a small quantity of 0.9 per cent physiologic sodium chloride solution was placed, with the tooth in it, and the anode end of a 30-volt battery was connected with it. The kathode end of the battery was connected to a calomel electrode. The whole apparatus was left alone for ten hours, after which time the results were noted.

There were a large number of calcium ions present in the sodium chloride solution. The source of derivation of this calcium cannot be anywhere else than the tooth, for none of the other substances employed contain calcium. The saline solution was then tested for phosphoric acid, but none was found. Also, it was observed that the calcium ions were present in larger numbers, in proportion to the greater length of time. The metal inlay itself was electrolyzed in the end. Among the various metals, in the case of pure gold inlay, the electrolysis was only slight, and in alloys, greater.

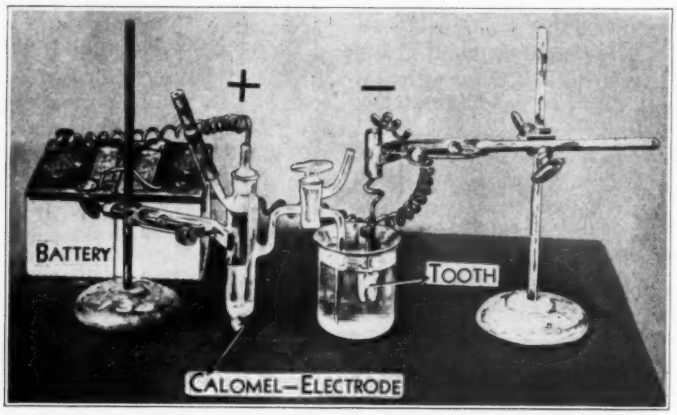

Fig. 1.—Experimental equipment.

Experiment 7. In this experiment, the same materials were used as in Experiment 6, with the difference that the connections of the poles of the battery were reversed. The kathode end was connected to the inlay in the sodium chloride solution and the anode end to the calomel electrode. The apparatus was undisturbed for a period of ten hours, after which the following changes were noted.

There were no calcium ions found in

the sodium chloride solution, but a large quantity of phosphoric acid was present, the source of which can be traced nowhere else than to the dental tissues. In this experiment, it was noted that the destructive changes were considerably less than in the previous experiment; namely, with the anode end in the sodium chloride solution.

Experiment 8. (Reactions in a salivary medium.) Saliva from various persons was collected and this was used in place of the physiologic sodium chloride solution. The two beakers were connected by means of an inverted-U tube arrangement which had been filled previously with Ringer's solution and gelatine. To one of the beakers was connected the kathode end of a 30-volt battery and to the other the anode. After a period of twenty-four hours, in the beaker to which the anode was connected, the presence of calcium ion was revealed and, in the other, phosphoric acid was found to be present.

Experiment 10. (Influence of potential difference in small amount, on dental tissues.) The same arrangement of apparatus was used as in Experiment 9, except that the strength of the battery was only 1 volt. In this case, calcium ion was found to be present only after a period of twelve days at the anode, and phosphoric acid at the kathode.

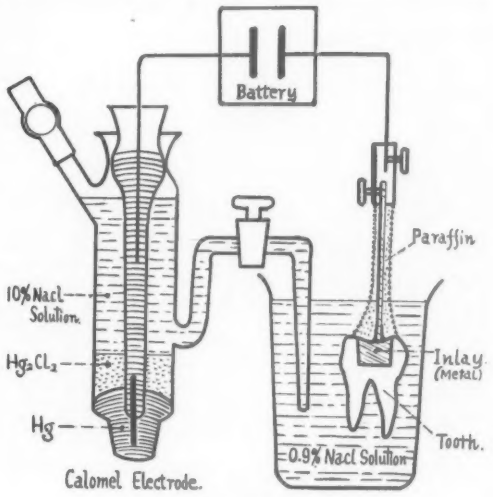

Fig. 2.—Experiment 6.

Experiment 11. (Contact electricity and its influence on dental tissues.) In all the foregoing experiments electricity from a battery was used for detecting

potential difference. From a theoretical standpoint, it was quite reasonable; but, in the following experiments, potential difference in the case of the various metals would be ascertained without the use of the battery. Details are shown in Figure 4. A 22-carat gold and aluminum inlay was used.

Two teeth are filled with the respective metals, namely, a gold inlay and an aluminum inlay, in both cases the metal projecting upward in the form of a pinhead. Both the teeth are placed in a beaker containing 0.9 per cent physiologic solution of sodium chloride and left to remain for a period of twelve days. Afterwards, on examination, it was found that calcium ions were liberated by the aluminum filled tooth and phosphoric acid by the gold filled one. Potential difference to the degree of 1 volt was produced, as shown in the table.

Another experiment was conducted using 22-carat gold and acolyte in place of aluminum, but the results obtained were identical, namely, calcium ions were obtained from the acolyte one and phosphoric acid from the gold one.

Experiment 12. (Control experiments.) Experiments similar to Experiment 11 were conducted, using the same metals in the same experiment; i. e., both the teeth were filled with 22-carat gold, and the potential difference noted. Next, both teeth were filled with aluminum and the results noted. The same procedure was carried out with amalgam, and so on. In all these experiments, when the same metal was used, neither calcium nor phosphoric acid was found to be generated at any of the teeth. The inference in this case is that there is no potential difference when the same metal is used and hence no physiologic reaction.

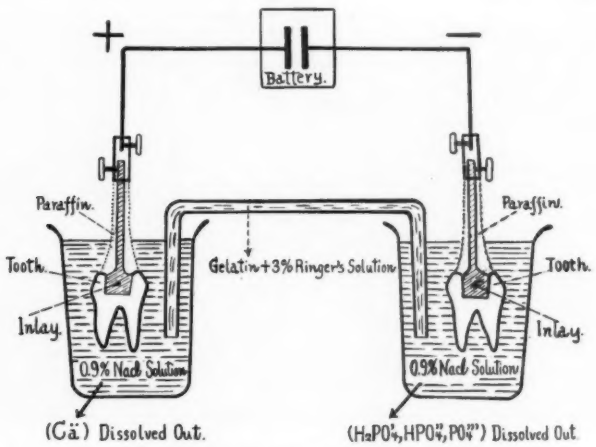

Fig. 3.—Experiment 9.

As Experiment 11 was performed without the use of the battery, it may be considered to be the same as having been done in the oral cavity with the different metals in two contiguous teeth, or in the form of inlays in two corresponding upper and lower ones. In either case, they would inevitably come in contact, with the dif-

ferent metals in them, potential difference thus arising.

OBSERVATIONS INSIDE THE ORAL CAVITY

In my dental practice, I have had opportunities to make observations on this particular aspect in a large number of cases. On examination of mouths, it was found, for example, that if the patient has gold and amalgam in his mouth, the amalgam acts as the positive pole, giving out calcium and producing decay. Gradually, the amalgam itself is destroyed. These changes are clearly visible to the naked eye.

a degree of 1 volt is present. The human tongue reacts clearly to a minimum of 0.37 volt of electricity. The same series of changes are produced in the muscle-nerve preparation.

Potential difference in the metals causes the generation of calcium, phosphoric acid, etc., by the dental tissues. Calcium and phosphoric acid being the most important and essential constituents of dental tissues, their liberation is injurious to the health of the tissues concerned.

The same metals in contact with each other either directly or through an elec-

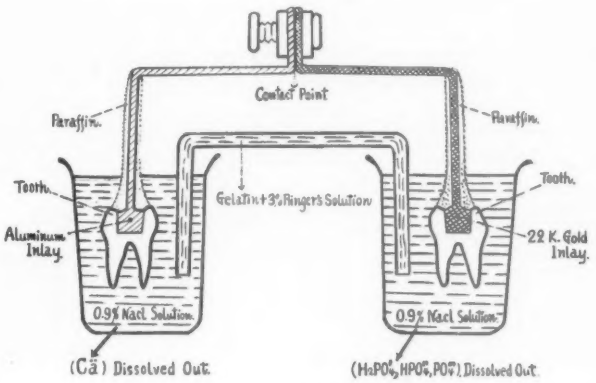

Fig. 4.—Experiment 11.

In the case of gold, there is a slight change of color and the structures become porous. Destructive changes are not so clearly visible. The intensity of the reaction generally depends on the amount of potential difference and the time; for example, the greater the reaction, the longer the time, and the greater the amount of potential difference.

The presence of different metals in the oral cavity gives rise, through their potential difference, to chemical and physiologic reactions. Potential difference up to

trolytic medium do not possess any potential difference. Hence, the use of the same metal in one mouth does not give rise to destructive reactions and undesirable physiologic effects. Simultaneous existence of dental alloy and gold or dental amalgam and gold produces greater potential difference and thus should not be used in contiguous or corresponding teeth. Between the nobler and the lesser metals, such as gold, silver, and copper, and in that order, the lesser the metal, the greater the liability to destruc-

tion. For example, silver is more liable to destruction than gold, copper more than silver, etc.

SUMMARY

1. A metal in a tooth acts as a positive pole and its presence causes the generation of calcium at that pole.

2. When the metal in the tooth acts as the negative pole, phosphoric acid is liberated.

3. When two contiguous teeth, or two corresponding upper and lower ones, contain different metals, they are liable to destruction.

EFFECT OF ADMINISTRATION OF EPINEPHRINE ON PROCAINE TOXICITY*

By EARL A. ZAUS and LEONARD W. MOODY, Chicago, Ill.

IN 1924, a committee appointed by the American Medical Association[1] brought out the following facts regarding the toxicity of local anesthetics: Most deaths were due to conditions other than poisoning from the anesthetic solution. Deaths which could be definitely attributed to the drug occured very quick ly, before any surgical procedure had been started. The toxic effects in man were similar to those seen in animals, consisting of convulsions and failure of respiration. Serious reactions from administration of procaine solutions were extremely rare.

The rôle of epinephrine in the development of toxic reactions was also considered in this report. It was pointed out that it played an uncertain rôle in the production of reactions; that it was likely to increase the effects of administration of cocaine because of the synergistic action, and that it probably lessened the incidence of procaine reactions. This conclusion, in regard to the epinephrine-procaine combination, was proved experimentally on animals by Hatcher and Eggleston.[2] The addition of epinephrine to their procaine solutions was found to markedly reduce the toxicity of these solutions. These were experiments in which a single dose of the drug was rapidly injected either intravenously or subcutaneously and the toxic effects were noted.

PROCAINE-HYDROCHLORIDE REQUIRED TO PRODUCE RESPIRATORY PARALYSIS*

Cat.	Procaine Alone	Procaine with 1:48,000 Epinephrine
	Mg.	Mg.
1	90	80
2	58	52
3	56	68
4	94	216
5	90	146
6	150	182
7	98	132
8	60	84
9	320	436
10	44	82
11	62	114

*Rate of injection 20 mg. per minute.

Injection of lethal doses of procaine was followed by cardiac and respiratory failure, occurring almost simultaneously;

*From the Department of Physiology and Pharmacology, Northwestern University Dental school.

1. Mayer, Emil: J.A.M.A., 82; 876 (March 15) 1924.

2. Hatcher, R. A., and Eggleston, C.: J. Pharmacol., 8:385, 1916. Eggleston, C., and Hatcher, R. A.: J. Pharmacol. & Exper. Therap., 13:433 (Aug.) 1919.

which led the authors to attribute the favorable action of epinephrine to its stimulating action on the circulation. It is to be recalled that, in the clinical reports of the A.M.A. committee, the deaths from procaine were found to be due to respiratory failure. It seemed advisable to us, therefore, to repeat the work of these investigators, using a technic by means of which the toxic effects could be studied in slow motion. This would show whether respiratory or cardiac failure appeared first and to what extent procaine administration and asphyxia contributed to the depression of the circulation. In a Starling pump until the animal was resuscitated. Then, the animal was permitted to "rest" for about an hour, to allow for elimination and destruction of the drug before a second injection was given. In studying the tables of these workers, it is evident that there is a wide variation in the toxic dose from animal to animal and that the cat is more resistant to the initial injection than to subsequent ones.

METHOD AND EXPERIMENTAL RESULTS

A fairly satisfactory perfusion apparatus was developed by applying air at a constant pressure (mercury trap) to the fluid in a graduated 50 c.c. buret, the rate of delivery being regulated by a Hoke needle valve. The procaine solution was injected first and then a solution containing 1:48,000 epinephrine was given. The rate of delivery was set at approximately 20 mg. of procaine-hydrochloride per minute. Artificial respiration was given by means of the Starling pump.

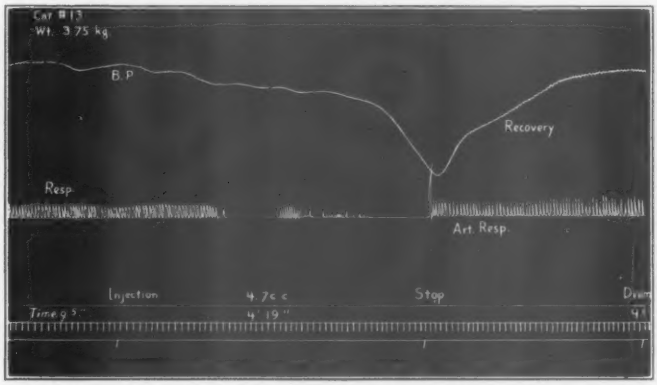

Fig. 1.—Tracing of blood pressure and respiration in cat given barbital, during intravenous infusion of 20 mg. procaine per minute. There was immediate recovery of the heart with the onset of artificial respiration.

cidentally, it might throw some light on the favorable action of epinephrine.

MacDonald and Isräels[3] used such a method in determining the relative toxicity of various local anesthetics. Cats that had been given barbital were given injections intravenously at a slow and constant rate until respiration ceased. Artificial respiration was given by means of

Experiments on eleven cats that had

3. MacDonald, A. D., and Isräels, M. J.: J. Pharmacol. & Exper. Therap., 44:359 (March) 1932.

been given barbital gave the following results on injection of the drugs into the femoral vein.

In two cats, procaine toxicity was slightly increased by the addition of epinephrine. In the remaining nine, there was a definite reduction of toxicity, ranging from 18 to 57 per cent, the average being about 35 per cent, as shown in the accompanying table.

A tracing is shown of the blood pressure and respiration of a cat that was first given procaine alone (Fig. 1) and then given procaine and epinephrine (Fig. 2). It is seen that the addition of epinephrine resulted in the maintenance of the blood pressure at a higher level and the acute drop (cardiac failure) is markedly delayed.

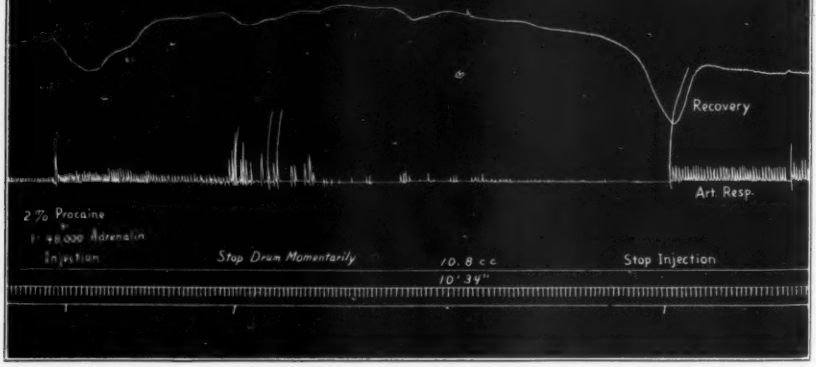

Fig. 2.—Tracing from cat referred to in Figure 1, after one hour rest. A procaine solution containing 1:48,000 epinephrine was employed. The blood pressure was elevated and there was delayed respiration and cardiac failure.

Under experimental conditions similar to those found in the clinical use of local anesthetic solutions on healthy subjects, the addition of epinephrine to procaine is found to diminish toxicity. Examination of Figure 1 brings out the following facts: Slow poisoning with procaine in the cat results in respiratory paralysis, the same cause of death seen in man from acute poisoning. This is soon followed by cardiac failure, which is evidently due more to asphyxia than to depression by procaine because recovery is almost immediate with the start of artificial respiration.

The tracings show that the addition of epinephrine results in maintenance of better circulation. The blood pressure is kept on a higher level, and circulatory collapse appears considerably delayed from the point of onset of respiratory failure. (Figs. 1-2.) These findings do not prove conclusively that the epinephrine effect is directly due to its effect on the cardiovascular mechanism. There is another possibility: Improved circulation through the liver aids in the more rapid destruction of procaine by the functioning of that organ. As yet, we have no experimental evidence to substantiate this idea.

The data recorded above rather definitely prove that epinephrine, as used in local anesthetic solutions, is a favorable agent. It should be remembered that this applies specifically to healthy subjects. Its use in certain disturbances of the autonomic nervous system,[4] particularly the thyrotoxic patient, may result in pronounced symptoms of intoxication on the basis of a circulatory collapse. In the presence of myocardial disease,[5] cardiac irregularities may develop. An attack of angina pectoris[6] may be induced if the coronary arteries are diseased. That it is a double edged weapon has been recently shown by Nahum and Hoff[7] in animals whose hearts had been previously damaged with either chloroform or benzene. Serious irregularity and tachycardia were demonstrated electrocardiographically.

4. Asher, Leon, and Flack, Martin: Ztschr. f. Biol., 55:83, 1911. Levy, R. L.: Am. J. Physiol., 41:492, 1916.

5. Roth, O.: Deutsche med. Wchnschr., 40:905, 1914.

6. Levine, S. A.; Ernstene, A. C., and Jacobson, B. M.: Arch. Int. Med., 45:191 (Feb.) 1930.

SUMMARY

1. The addition of epinephrine to procaine solutions reduces toxicity.

2. This favorable effect is probably due to (1) delay in the absorption rate or (2) stimulation of the circulation.

3. Respiratory failure has been shown to occur first in experimental poisoning. Cardiac failure following poisoning with procaine is probably due mostly to asphyxia.

7. Nahum, L. H., and Hoff, H. E.: J. Pharmacol. & Exper. Therap., 50:336 (March) 1934. Hoff, H. E., and Nahum, L. H.: J. Pharmacol. & Exper. Therap., 52:235 (Nov.) 1934.

MODERN DENTAL PORCELAINS*

By FRED R. FELCHER, D.D.S., Chicago, Ill.

DENTAL porcelains occupy a prominent place in present practice, and a great many suggestions have been made for their use. Unfortunately, analysis fails to confirm the value of the suggestions or technics in some instances, and this shows a lack of understanding of the materials and their reactions under the various conditions to which they are subjected.

To consider dental porcelains simply as a combination of silica, felspar and clay, to which are added coloring oxides, is far from completing the picture, for considerable effort is involved between the acceptance, selection and handling of the raw materials and the finished product such as we get in bottles and jars for our use.

Like everything else, porcelains have their place and their limitations, and these limitations are many. Dental porcelains, as we understand them, are a hard material belonging in a degree to the glaze branch of the ceramic family. In hardness, they register approximately No. 7 on the scale by which the hardness of materials are determined. Thus, por-

*Read before the Section on Partial Denture Prosthesis at the Seventy-Seventh Annual Session of the American Dental Association, New Orleans, La., Nov. 6, 1935.

celains used for dental purposes are 3 degrees in hardness less than the hardest material, diamond, which registers No. 10. The porcelain that we use therefore, is hard enough to scratch plate glass easily, and is considerably harder than the average mineral. The disappointing feature is that porcelain has no "give" or yield and, because it will not yield, offsets, to a degree, the quality of the hardness.

Experience teaches us that in using porcelain for dental restorations, and I refer here to making jacket crowns, bridges, etc., the porcelain should be supported in such a way as to eliminate stresses directly through it. If we have a short stumplike base, and cover this with a long jacket crown, and this crown is subjected to normal attritional forces, a fracture may occur in the form of a half moon. Where a twist force is present, such as is noted in an all porcelain swing-on bridge, or in jacket crowns where the base is cone shaped, or in peg-shaped lateral cases wherein it is desired to fill a space, longitudinal fractures occur, for, during mastication, food may cause a fracture through the long axis of a tooth owing to pressure on the proximal surfaces of the unsupported porcelain.

For a number of years, I have emphasized that when teeth are badly broken down, and are to be restored with jacket crowns, it is necessary to build them up, usually with gold cores, to take directional forces. Thus, we could allow for the so-called "cushioning" of the forces by tooth movement in the alveolar socket. The idea of the so-called "thimble crown" was based on the same principle, with the explanation that "if force was absorbed at the point of stress and not distributed . . . partial jackets were in order." Time has proved that. Let us keep this in mind when reinforced crowns and bridges are discussed elsewhere in this paper.

OPAQUE BODIES

There are many materials that are used in the ceramic industry for the purpose of producing opacity and where different bodies are made for special needs. We in dentistry have ready-made porcelain bodies submitted to us by manufacturers, ready for use. These bodies, while they may be made by a similar formula, vary considerably in the finished product. The coefficient of expansion or contraction can hardly be expected to be the same. If these porcelains are then changed by the addition of something foreign, it must be expected that a change will take place in the coefficient of expansion or contraction of the porcelain body, which will cause immediate or subsequent breakage.

Adding raw clay, or fire clay, or alundum or any of the high-fusing opacifying materials to a porcelain such as we use is detrimental unless these materials are balanced. It appears that a knowledge of the characteristics, physical, chemical, pyrochemical, etc., is an absolute necessity before attempting to offer technics in making restorations in the mouths of our patients.

It has been my privilege to have been associated and to be still associated with the application of ceramics somewhat beyond the field of dental porcelains. One of the things that have come to mind frequently has been the efforts made in the balancing, for instance, of a glaze over a body. When a body is selected and fired, it is necessary to experiment with innumerable glazes of various formulas until a glaze having the same coefficient of expansion and contraction is obtained, so that when it is fired over the ceramic body, it will fire without "crazing." As stated before, dental bodies are more than

a mixture of silica, felspar and clay with some metallic oxides for coloring. That is only the beginning. Manufacturers' formulas are, of course, designed for their own particular requirements. Physical and chemical properties of the raw materials are determined and these materials are compounded to a formula; for instance; 85 per cent felspar, about 4 per cent clay and about 11 per cent silica. After calcination, coloring oxides may be added. This subject will be taken up a little more in detail when the firing of dental bodies is discussed.

It is a physical law that light rays will pass through a translucent object. If an opaque object is present behind the translucent object, the light rays will bend, with a different effect from what would be had if the opaque body were not present. Human enamel is very translucent and practically colorless. The yellow of the dentin reflecting through the enamel at the cervical aspect of the tooth imparts the yellow, because the enamel is thin enough in that area to be affected by the presence of the dentin. Extreme translucency of incisal edges is due to the fact that, particularly in younger people, failure of the dentin to reach far enough toward the incisal edge does not prevent the light rays from passing through the enamel at that point. Often these extremely translucent areas reflect the conditions of the oral background.

Dental porcelains are not so translucent as the human enamel and, instead of having the enamel rods or other characteristics of the human enamel, are full of air spaces, some in greater quantities than others, this depending on the porcelain itself. If we place an opaque object behind a piece of porcelain, bringing it close enough to the line of vision that it allows the light rays to be changed, we may expect to have a condition not unlike the dental-enamel relation. That is, in my opinion, the prime requisite for an opaque material.

In experiments with opaque bodies, which required many months and many hundreds of formulas, an opacifying porcelain was finally produced that could be used in balance with any dental porcelain, by taking a mixture of this material and the body color of the porcelain. In one experiment, a white opaque body was mixed with a white dental body and fired on a matrix. Over this, a jacket crown of the same white dental porcelain was built. The result was interesting; to all appearances, a white tooth with an incisal tip that seemed to produce an optical illusion of a translucent incisal edge. In developing a semi-opaque body, it was the purpose to make a material that would assure a relationship not unlike the dentin-enamel, making possible the use of any porcelain by producing a body close enough in coefficient harmony with all dental bodies. It was found that by the addition of approximately 3 per cent of the dental porcelain and 1 of the opaque, not only would the coefficient balance be raised, but also the foundation color would be such as not to interfere with the desired color of the jacket. Strains were thus eliminated and it was possible to build jacket crowns of more lifelike appearance.

REINFORCED BRIDGES

Following the introduction of semi-opaque bodies came suggestions for reinforced bridges. Unfortunately, these bridges were not advocated or sponsored professionally, but mainly through laboratories. Here again, it seems that the sponsors had much to learn about the materials and the conditions necessary for successful results. Many of us have had experience with reinforced porcelain in dentistry, for the idea is not new. We can, no doubt, recall the gassed and dis-

colored appearance of the early bridges or continuous gum dentures with soldered teeth. When we consider that, in the ceramic industry, enamels are baked on metal with satisfactory results, it might seem possible to use a similar method successfully in dentistry.

In order to discuss this thoroughly, it is necessary to consider certain factors. To begin with, there is no chemical union between a porcelain body and a metal. There is a difference in the coefficient of expansion and contraction of dental porcelains and the metals used, and also to be considered are the atmospheric and firing conditions required by porcelain When porcelain is fired to a metal, it is necessary that no conditions be present which would cause gassing or exert a repellent action, forcing the porcelain from the metal. Heating metals, in many cases, creates this condition.

Platinum in its refined state is very ductile, having a property that makes possible its being drawn extremely fine. If this metal, at high temperature, is brought in contact with certain materials, such as the compounds of silicon, carbon, boron and certain alkalis, the platinum tends to become brittle and the desired properties are interfered with. This change has considerable to do with its action on porcelain during firing. In one method, a coping is used made of a sheeting of 5 per cent iridioplatinum, soldered with 1400 or 1600 C. solder and invested in a soldering investment. This, in turn, is covered with a semi-opaque body, over the semi-opaque, dental porcelain in the form of a bridge. When this type of bridge is torn down, the following conditions are found: The coping is usually brittle and efforts to reinforce the coping produced a lesser adaptation between the porcelain and the metal. The greater the attempt at reinforcing, the greater the tendency to gassing and discoloration. Of course, attempts have been made to eliminate this gassing as far as the material element is concerned; for instance, using pure platinum as a solder. Let it be understood here that we are considering the effect of metals on porcelains at this time and not gassing, which is sometimes present owing to the presence of improper opaque bodies or foreign materials.

Let us at this time consider what is accomplished in the ceramic industry when it is desired that a metal be covered with an enamel. Here, a hard metal is selected, which is thoroughly cleaned and roughened. On this a ground coat is fired that has been previously experimented with which it will not craze when fired to the metal. This ground coat is, in turn, covered with the enamel, which has also been previously balanced, until it is in perfect harmony with the ground coat and the metal. This process is used in the manufacture of sanitary wares, the sides of electric refrigerators, tile, etc. The thing that we note when examining these products is that the metal is rigid enough to prevent bending or yielding. If the metal will bend, the ceramic covering will flake off, and the coating can be crushed with the finger nail, not unlike an eggshell.

There are certain fundamentals in the success of any porcelain restoration, and it would be appropriate at this time to analyze these in their proper sequence. The first consideration, and an important one, is the conservation of pulps. It should be unnecessary to remove enamel for a bridge or a reinforced jacket more than for a simple case. Where some use iridioplatinum sheeting of 0.0035 to 0.0050, or, in some cases, the 0.0035 doubled, too much tooth must be sacrificed and esthetic values are lost. It would be pretty difficult without pulp involvement to cover the preparation with, first,

0.001 matrix, then this in turn with a 5 per cent iridioplatinum sheeting with a gage of 0.0035 to 0.0050, a total of from 0.0045 to 0.0060 of metal, and this in turn covered with semi-opaque and regular porcelain. Next in importance, it is necessary that the metals be sufficient in hardness not to allow bending or yielding under attritional stresses, for, as stated before, there is no chemical union between a ceramic body and a metal.

It is necessary to be able to build on to the foundation, whether for a single reinforced porcelain jacket crown or a bridge, to prevent directional forces. This was discussed in the early part of this paper. The metals used and the means used to unite these metals must be free from conditions that would set up a reducing atmosphere during firing, which, as stated before, is one of the causes of gassing and discoloration. The hardness of the metals is important. If pure platinum is used as a soldering medium, it must be remembered that, while it might prevent gassing, the Brinell hardness of platinum is 60, which is quite low when compared to the average clasp golds, which have a Brinell hardness of 200 and, in some instances, a higher.

No bridge is stronger than it abutments, and the abutments of this type of bridge require a rigid metal support so that attritional forces are cushioned by the alveolar tooth movement. In my work, after a few years of serious endeavor, a process was finally evolved that has been proved successful in the mouths of patients in hundreds of cases. The technic is based primarily on dentistry and esthetics. I have seen sufficient results to be willing to suggest more simple methods of preparing teeth for jacket crowns and for bridge abutments. In fact, I have been making successful reinforced jacket crowns and bridges with a preparation wherein the lingual and proximal aspects are tapered to allow for metal and porcelain, placing a shoulder across the labial and part of the proximal only. I have also been able, where I have not desired to remove sufficient enamel for jacket preparations of this suggested type, to prepare teeth lingually on the order of pin inlays, using a pin inlay built of this metal as an abutment. Through the suggestion of B. B. Rappaport, of Chicago, I have been able to develop for the posterior teeth reinforced porcelain inlays wherein a matrix is made of iridioplatinum sheeting. The margins are reinforced with the metals that I use, and a means of reinforcement is also placed inside of the matrix, after which the semi-opaque porcelain and porcelain are fired. This type of inlay allows for beveled marginal walls not unlike those for gold inlays, and it is possible to burnish the margins after cementation, allowing for well-sealed inlays.

In order to be able to accomplish what I have just described, it was necessary to produce an extremely high-temperature precious metal that would balance with the semi-opaque porcelain and the dental porcelain and allow for a union close enough that removal of the ceramic body from the metal could be accomplished only by bending or by grinding, by hitting with a hammer or by removing with hydrofluoric acid. The metal when cooled slowly takes on a Brinell hardness of between 185 and 200. With such a metal, there is then the possibility of producing reinforced crowns or bridges, if the framework is strong enough to prevent "give" through the metal and to allow compensation by normal tooth movement. The semi-opaque porcelain, in turn, is capable of being balanced with any porcelain on the market, not only as to coefficient of expansion and contraction, but also, by mixing with the dental body to be used, it can be made to balance

in color, yet completely hiding the metal structure. The investing materials that I later had to produce were free from many of the compounds or conditions that would tend to change the properties of the platinum group metals.

In cases wherein no shoulders are present, we are able to build adapters fitting the tooth closely, not unlike cast gold crowns, and building shoulders for the adaptation of the porcelain into the metal. There are a number of ways in which this technic is capable of being used in dental conditions. One noticeable thing about the use of this technic where metals are exposed is the lack of porosity in the metal and its ability to be burnished. In this way, I differ with another suggested method of using a metal made up of a combination of platinum and gold capable of being cast and to which is added a medium low fusing porcelain. With such a method, aside from porosity of the metal, the softness due to the use of too soft metals and the disadvantage of using low fusing porcelains would seem against it.

Many uses of this technic will be found in jacket crown construction where a stronger crown is desired, or where teeth are broken down so that the necessity of building for porcelain support is required. It can be used in those cases in which teeth have short stumps or are too tapering, or in cases of small lateral incisors when it is desired to build out in order to fill a space, and when reconstruction of the mouth requires building jacket crowns in order to compensate for attritional wear. In each of these cases, adapters can be built and porcelain baked directly to the metal. Bridges, as mentioned before, can be built, the recommendation being that while we are able to design each case, it is important that, in the construction of this type of bridge, the framework be built, in accordance with the functions of the bridge for that mouth. Thus, it will be seen that instead of making a coping of iridioplatinum to which is added a bar, and attempting to reinforce by means of solder or platinum, it is possible to build adapters on the order of thimbles or with wide wings or build down to compensate for directional forces, each adapter being sufficiently hard and rigid to prevent any give in the adapter itself.

There is a decided advantage when porcelain is baked directly to a metal over the usual method of attaching porcelain with cement. Cement has been responsible for many fractures of jacket crowns because of improper cementation, mixing cement too thick and too rapidly, causing heat to generate and expansion to take place and, in turn, setting up strains in the porcelain. Cement does not adhere to the porcelain or to the tooth structure very well, nor do we have the perfect adaptation with cement such as we find in a balanced condition of porcelain against metal. It is far more difficult to remove porcelain from this metal than it is to remove porcelain cemented to a tooth.

The combination of the metal, the porcelain and the investing materials, therefore, produces a method not unlike those used in the ceramic industry. The technic can be described as follows: Teeth are prepared according to the requirements of the case. If shoulders are present of sufficient width on the lingual aspect, it is not necessary to expose metal in the finished product. If the preparation is made with no lingual shoulders, adapters are built fitting closely to the tooth, not unlike a cast gold crown, and the shoulder allowance is made in the metal. These adapters are heavily reinforced lingually, mesially and distally, extending around the tooth sufficient enough to give at least a three-quarters

grip around the tooth. If, as in swing-on cases, it is desired to protect against twist force, a slight groove may be made in the tooth preparation, mesially and distally. The adapters are covered with modeling compound in the shape of a tooth, placed in the mouth of the patient and checked for contact, and a plaster impression is taken with them in position. The dies are replaced in the impression and models made. To the adapters are attached a flat iridioplatinum bar, which is altered to prevent directional forces in the dummy, and attached to the adapter by means of this metal. To this framework is now applied a ground coat and a mixture of the semi-opaque porcelain and the dental body and fired to a high biscuit bake of 2400 F. This, in turn, is covered with body color of the porcelain used and the subsequent enamel color for the complete building up of the case. In this technic, beginning with the high biscuit fire and the final fire, the porcelain is allowed to cool slowly in the furnace in order to obtain the greatest degree of hardness.

Where carefully carried out, this method will permit the use of porcelain and metal, producing esthetic restorations with the least amount of tooth destruction and to meet conditions we find in the mouth and must deal with as dentists. This bridge is not offered as a panacea, but to be used only where indicated. According to the reports from those who have been checking over these cases, results are beyond the fondest expectations.

DENTAL PORCELAINS

As mentioned before, dental porcelains in the high fusing group are made of a high percentage of felspar, silica and clay to which, for coloring purposes, are added materials in the form of metallic oxides. In the previously mentioned formula that would be productive of a high fusing body, the general softening temperature of the ingredients would be found to be as follows: felspar, approximately 2300 F.; clay, approximately 3200 F.; silica, approximately 2900 F. These materials are selected according to the necessary properties and calcined possibly a number of times. The lowest fusing materials or the eutectic would naturally be the felspar, because of its lower fusing point. When these ingredients are baked together, the end-results will be a body having a softening temperature at approximately 2400 F. If to this body is added raw materials such as silica or clay, or both for plasticity, it is reasonable to assume that the body would have a higher fusing temperature, so that if it were desired to have a porcelain body with a firing temperature of 2560, enough of the raw ingredients would be added to compensate for firing at that temperature. The eutectic or flux then becomes the original calcined mass, which, as stated before, has a softening temperature of 2400, and this is why I have repeatedly recommended that at no time should a high fusing body be subjected to an extreme temperature of 2400, allowing time to complete the pyrochemical change for our needs. It will be noted by any one familiar with ceramic bodies that by calcining, and because of the nature of the ingredients themselves, we produce a hard and stronger insoluble body. Manufacturers of teeth seem to recognize this as is evidenced by the fact that artificial teeth seem to be exclusively made of high-fusing bodies. A lower fusing porcelain may be produced by the addition of combinations of calcium and carbonate, sodium and carbonate, potassium and carbonate, borax, lead glass, etc., the combination of which produces glasslike substances. This may be added to the high fusing bodies, a material with

a free flux resulting; or there may be a change in the original formula and the addition of these types of materials compounded to afford a combined flux. This accounts for the difference between free and combined flux that a certain manufacturer of low fusing bodies claims to have less shrinkage and greater strength because of the latter conditions in the manufacture.

It is variably acknowledged throughout the ceramic field by manufacturers of dental porcelains and has been evidenced by previous experiences wherein low fusing bodies were used before the advent of high fusing porcelains that, aside from their inability to withstand shock, low fusing porcelains are subject to solubility by the action of organic mouth acids in many instances.

A decided drawback to the use of low fusing bodies is the fact that when it is necessary to grind a finished prosthesis, it is impossible, especially in bodies that have a firing temperature below 1950, to use a glaze high enough to withstand general mouth conditions because of the danger of devitrifying the porcelain while the glaze is being fired.

The manufacturer of the low fusing porcelain maintains that his porcelain can be polished. This statement cannot be accepted in connection with high fusing or any other type of dental body, because an examination of all dental bodies show them to have innumerable air spaces. If porcelain is ground as fine as possible, and then polished, it may appear to be smooth, because the surface pores are filled with polishing medium. When this washes out, roughness will be present. The more porcelain is ground, the more the air spaces are opened. The use of lower fusing bodies must be viewed with suspicion, because there is too much evidence of a lack of durability when it is used in a complete restoration. It would seem to have a place mainly for "touch-up" work.

CONDENSATION

Much has been claimed for the different methods of condensing porcelain; for one method, greater density over others. Some methods employ extreme vibration and the withdrawal of water, while others use a method wherein the porcelain is applied more or less in a wet stage, this water being drawn off by the use of absorbants, or by placing the moist mass in dry porcelain powder. A series of tests which I made and in which every available porcelain was used, including the high, medium and low and one foreign manufactured porcelain, seems to bear out the fact that, all things being equal, where we are operating under clean conditions, conditions that are free from elements preventing accurate pyrochemical results, irrespective of the method used in condensation, whether there is vibration or the porcelain is applied moist and the excess water removed by capillary withdrawal, after firing the end-results are the same. The difference as shown by study under a high-powered glass, where certain bodies show more or less air spaces is due to the differences in the ceramic bodies themselves from the start of manufacture or to the addition of raw bodies, or both.

This should not be hard to understand, if it will be remembered that, in the manufacture of teeth or in the manufacture of porcelain, for our use, the material is the same with the exception that, in manufacturing teeth, a paste is made using certain ingredients; for instance, gum tragacanth. This, being a thick material, would, of course, take up considerable room between the particles of porcelain; as when porcelain is applied over a matrix, in a wet condition, and the water merely drawn off, greater shrinkage takes

place in firing. In manufacturing teeth, the porcelain, at the dry biscuit stage, after it comes out of the mold, is considerably larger than the finished tooth after it is fired. A ready made tooth and a crown made of the same materials (dental porcelain), with the possible exception that, in the place of gum tragacanth, starch or sugar may be present for the purpose of adding plasticity, appear alike when fired alike.

Tests of all the available porcelains were made under both methods of condensation, all blocks being placed in the furnace at the same time, all of the same make of porcelain, of course, being fired singly. Here again, it would seem that before one can talk technically about the shrinkage of dental bodies, discussing what the ignition loss may be or any other changes that take place, it would be necessary to know all about materials and their individual characteristics before manufacture, and the method of manufacture. These, of course, are kept more or less secret by the manufacturers. The addition of materials to increase the firing temperature, the plasticisers, if any, and the variable applied by the human equation, namely, the methods of condensation used, are some things that we are not always able to control.

If more water and more organic binding material are used in building up porcelain, we get, in the final firing, more shrinkage. The natural tendency of porcelain is to contract three ways: (1) toward the center of the mass, commonly referred to as in the direction of its greater bulk; (2) toward heat, and (3) toward a metal. If a platinum matrix is clean and free from foreign particles of plaster and other impurities, and the porcelain is built on this matrix by a wet method and fired, the contraction of the porcelain will tend to warp the matrix more quickly than if the porcelain was vibrated and the water drawn off during the vibrating process; for, in the latter method, the porcelain particles are forced into closer relation, more porcelain being permitted in the given mass than is present in the former, and there being less firing shrinkage because there is less space between the particles. For this reason, we recommend technics of manipulation wherein vibration is used, so that the shrinkage will not be so great during firing. When porcelain is built over a matrix in too large quantities for the matrix to withstand the pressure of the contraction upon it, it is advisable to compensate for the shrinkage by ditching at the shoulder or through the entire construction, labially and lingually.

PORCELAIN INLAYS

In inlay construction, irrespective of the technic used, whether it be the direct method of making an inlay matrix in the mouth, or the indirect method of making an inlay matrix in the mouth, in every instance after the matrix has been thoroughly adapted, it should be properly invested and the inlay built into the matrix. In this way, it is possible to use thinner platinum foil and eliminate the difficulties that are usually encountered in the older method of building inlays, whereby the shrinkage of the porcelain tends to warp the matrix, in the investing method, and we must not confound it with a method of baking porcelain directly in an investment. If the investment has the ability to withstand extreme temperatures and be free from dimensional changes, the invested matrix resists in every way the effect on it of the shrinkage of porcelain, perfect fitting inlays resulting that are free from ditching and require the minimum number of firings.

I believe in the use of the platinum matrix for all inlay construction, for this

compensates in every case not only for the use of high fusing bodies, but also for the thickness of cement with which the inlay is to be subsequently set. If, as is asserted, it is possible to bake porcelain in an investment without a matrix, a technic that has many drawbacks, and the inlay fits to perfection, it must be expected that, with the setting of the inlay in the tooth, the former will be raised above the cavity in proportion to the thickness of the cement used.

FIRING

In the use of high-fusing porcelains, the temperature timing should start at about 1900 F. and in five minutes reach 2200, and five minutes later, 2200 to 2400; a total time of ten minutes from 1900 to 2400, which will give a high biscuit bake. Modifications can be made to suit the operator; i. e., a low biscuit to be obtained at 2350, a high biscuit at 2400 and a final firing with the temperature the same as for the high biscuit stage. After the high biscuit finish has been ground to requirements, the porcelain is removed and examined for the degree of finish required, and, if any additional firing is required, it is replaced in the furnace and allowed to reach 2350 to 2400 degrees as rapidly as possible, this temperature being held for a few minutes, as required.

In medium fusing bodies, a temperature from 1900 to 2200, reached in five minutes, is sufficient to give a high biscuit bake and, in construction of pontics, for which one fire may be required, a temperature of from 1900 to 2200 reached in five minutes and held at 2200 for four or five minutes will give it the desired results.

Because low fusing porcelains should be used for patchwork, the firing of these should be a simple matter. In firing glazes that are not subject to the critical conditions of firing dental bodies, to obtain the best results it is advisable to fire slowly, which will enable the glaze to flow properly.

SHADES

To attempt to reproduce the shades of teeth in dental ceramic bodies is indeed difficult because of the difference in structure formation of the human enamel, its translucency, etc. Attempting to match teeth in shade by means of a ceramic body that does not have the same degree of translucency or the refractive index of the enamel and that has throughout its structure numerous air spaces is an extremely difficult thing. Adding to this the surroundings of the room where the shade is to be taken, the light conditions of the room, the time of day, the conditions of the oral cavity, and then the attempt to match a tooth with a shade guide held 4 mm. or more in front of the tooth to be matched help to make matching quite complex. The difference between enamel and porcelain and the inability to match them are easily noted when an attempt is made to place an incisal inlay in a tooth. The inlay becomes noticeable when the patient turns the head and the light rays strike the inlay from an angle other than the one at which it was matched.

At the present time, there is available a shade guide of artificial teeth made by a prominent manufacturer that comes very close to meeting most mouth conditions, depending more on cervical colors rather than incisal, and giving us a better means of harmonizing colors than ever before. It is extremely important that we concentrate on the contour reproduction of the teeth in every restoration, except of course, in small inlays.

The use of stains is recommended where it is necessary to bring out individual characteristics. My experience

with stains and the covering of these with glazes extends back a number of years. Time seems to confirm the fact that, in order to obtain the highest esthetic effects in porcelain restorations, even in inlays, the use of stains in combination with glazes is not to be overlooked. It appears that covering dental porcelain with a fine layer of stain, which is fired on, the stain being in itself somewhat opaque, and in turn covering the stain by glazes, gives an effect that closely resembles that of the human enamel. What we really have is an optical illusion, such as incisal translucency. In incisal inlays, quite frequently, it is possible to eliminate the artificial appearance of inlays by the use of stains and glazes as just described.

25 East Washington Street.

ECTOPIC ERUPTION OF PERMANENT TEETH AS A FACTOR IN PREMATURE LOSS OF DECIDUOUS TEETH*

By SAMUEL J. LEWIS, D.D.S., Detroit, Mich.

DURING the past twelve years, I have been observing some interesting phenomena in dental development in two groups of children, one the Merrill-Palmer children, whom I studied in connection with a research project, the other the children I have seen in my office practice. One matter that has interested me is the prevalence of the so-called premature loss of deciduous teeth and the effect of this loss on occlusion. I realized, as all of you do, that about 90 per cent of these losses could be attributed either to dental caries and its sequelae or to various types of trauma. In making yearly records of these cases, I noted that some deciduous teeth were shed prematurely without a history of either caries or trauma, and I became interested in learning the causes of these losses.

The textbooks and periodicals offer little explanation of the etiology of premature loss. McCoy states, in his latest textbook, that, except for such known causes as caries, extraction or traumatism, the true cause of premature loss of the deciduous teeth is often a matter of conjecture. Such a statement shows the necessity for a more thorough study of the deeper and more obscure phases of growth and development and a better understanding of the predisposing causes of malocclusion. R. C. Willett, in writing on the problem, says[1]: ". . . the problem is complex, involving as it does the determination of the basic causes underlying the most frequent premature loss of deciduous teeth, and the predetermination of the effect such a loss of functional units will produce in the formation of the dental arch and the future occlusion of the permanent teeth." Though all of us will agree that the problem is a complex one, there are phenomena connected with it

*Read before the Section on Orthodontia at the Seventy-Seventh Annual Session of the American Dental Association, New Orleans, La., Nov. 6, 1935.

*Material for this paper was gathered through the cooperation of the Merrill-Palmer School by means of a grant from the Children's Fund of Michigan.

1. Willett, R. C.: Angle Orthodontist, April, 1933.

which can be analyzed in contribution toward a solution.

A year ago, I sent a questionnaire to 150 orthodontists and fifty pedodontists in an effort to learn what they had observed in their office practice that was relevant to this problem as to the causes of the early loss of deciduous teeth. In doing so, I was not unaware that some research workers consider the questionnaire method unscientific and that clinical observations are as a rule less systematic and complete than those of research workers. Nevertheless, I found some links in the chain of evidence missing in my study of the problem, and I believed that some of these men might have made observations that would help to weld the chain. I believe too that clinical practice will always be an important source of knowledge in such fields as this. Ninety-one orthodontists and thirty-eight pedodontists answered my questionnaire and my faith in the help this method might bring was fully justified. Many supplied me with evidence that not only added new links to the chain of evidence that I was gathering, but also offered suggestions that open up new avenues of investigation. At this point, therefore, I should like to express my great appreciation for their help, without which I should still be groping in the dark at some points along the way.

It is not my purpose to discuss the meaning of premature loss or all the points brought out in my research and the answers to my questionnaire. These points, and also the problem of terminology so near to the heart of John E. Gurley, I intend to attack at some future time. Here, I should like to present for discussion one cause of premature loss of the deciduous cuspids that I have observed in my practice, and that I believe offers a real opportunity for preventive orthodontia; namely, ectopic eruption of the permanent teeth.

Fig. 1.—Types of malocclusion in mandible due to early loss of deciduous cuspid.

Fig. 2.—Type of malocclusion resulting from early loss of deciduous maxillary cuspids.

In many children, I have observed that the deciduous cuspids were absent as early as the seventh year. In the majority of cases, it was the mandibular cuspids that were absent, and usually only one was missing, but sometimes both. To a less degree, I found the maxillary cuspids missing, but, in these cases, both were usually absent. Unfortunately, most of these cases reach the orthodon-

tist's office after the loss has occurred, and it is difficult to obtain a satisfactory history. The parent or the dentist usually says that he is sure the tooth was not decayed or extracted, nor did the Merrill-Palmer records or my office records show extraction or caries in any case of this type. Owing to a faulty technic, the roentgenographic records of these cases showed little of value. I found many cases showing this loss and its effect on occlusion, and, as a result, I concluded that yearly records were not sufficient to show the developmental changes that I

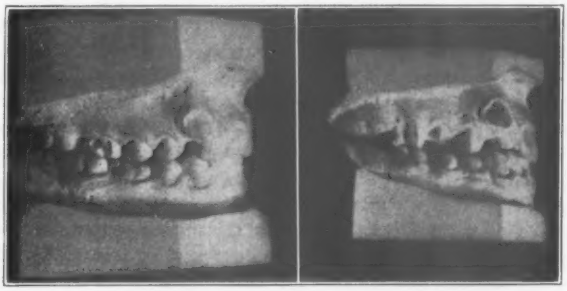

Fig. 3.—Two types of malocclusion resulting from early loss of maxillary deciduous cuspids. Left, drifting of posterior teeth mesially. Right, lack of mesial drift. In both cases, the permanent cuspids are in malocclusion.

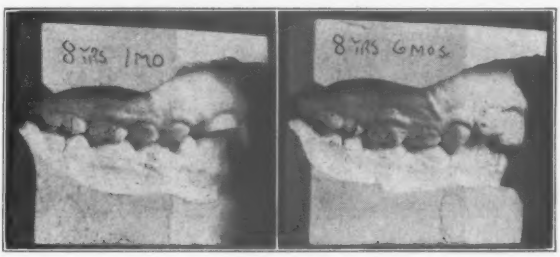

Fig. 4.—Types of malocclusion resulting when mandibular deciduous cuspid is lost early. There is a deep anterior overbite and a discrepancy in the occlusion of the anterior teeth.

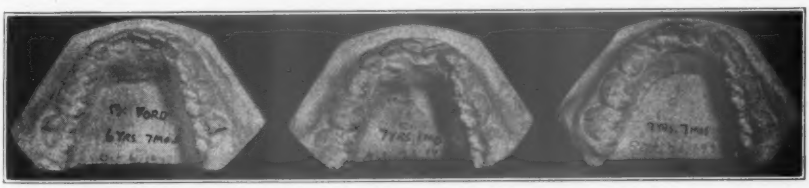

Fig. 5.—Consecutive models showing what happens in mandible when ectopically erupting lateral incisor impinges on cuspid, causing its early loss. The models were made six months apart.

was looking for, and that model and roentgenographic records made at least every six months were necessary.

The accompanying illustrations show this type of loss and the effect on occlusion. Figure 1 is typical of the cases in which there is a unilateral loss of the deciduous cuspid in the mandible. These cases are very frequent in my practice. Recently, I made models of two of these cases only an hour apart. In the last two years, I have undertaken the treatment of twenty-five such cases in the mandible alone. Figure 2 shows a type seen quite often in the maxilla. In this type of case, two effects on occlusion are common. Figure 3 shows what usually happens. At the left, while the permanent cuspid is in malocclusion, the molar relation is normal; at the right, not only is the cuspid in malocclusion, but also the teeth posterior to the cuspid have evidently migrated anteriorly, or, in any event, are in distal occlusion. Figure 4 shows the side view of the two cases seen on the same day. Though the loss is in the mandible, as yet there has been do disturbance in the molar and premolar area. The collapse seems to be in the anterior element.

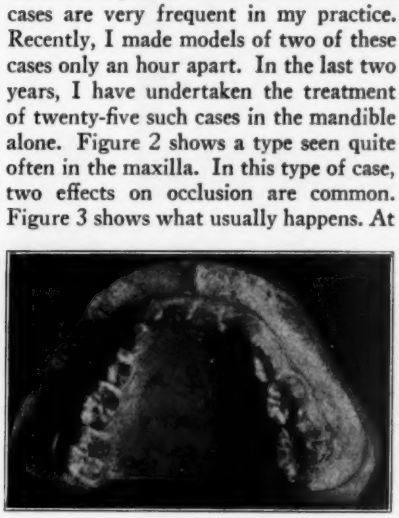

Fig. 6.—Ectopically erupting mandibular right permanent lateral incisor impinging on deciduous cuspid.

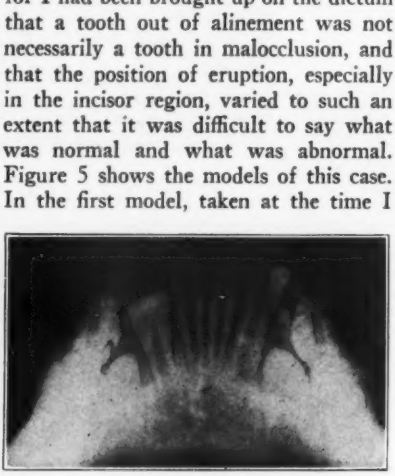

Fig. 7.—Case shown in Figure 6. The radiolucent area on the cuspid is due to pressure of the erupting lateral incisor.

About the time that I became alarmed at the frequency of these cases and the fact that I was not observing the full course of development, a patient whom I had been observing for about two years came to me. He had presented irregularly alined lower incisors, and I had made records and was waiting to see whether they would aline themselves without orthodontic interference. I was not particularly worried about the case, for I had been brought up on the dictum that a tooth out of alinement was not necessarily a tooth in malocclusion, and that the position of eruption, especially in the incisor region, varied to such an extent that it was difficult to say what was normal and what was abnormal. Figure 5 shows the models of this case. In the first model, taken at the time I first saw the patient, there was evidence that the lateral incisors were going to erupt lingually. When he came back six months later, the lateral incisors were erupting and were decidedly displaced and rotated. I sent him away for another six months, and, when he returned, the lower left cuspid was missing and the left lateral incisor had moved into the space formerly occupied by the cuspid. The cuspid had been lost, but I was positive that it was not decayed, and it had not been extracted or knocked out. This was my first clue as to the possibility that the ectopic eruption of the lateral incisor,

caused the premature loss of the cuspid tooth.

At about this time, another child came into the office with a similar condition, though less marked. I noticed that one cuspid was rather loose, though the patient was only 7½ years old. I made some models and roentgenograms so that I might see what was happening. Figure 6 shows the model of this case and Figure 7, the roentgenograms. You will note a dark shadow or radiolucent area, showing a premature absorption of the right cuspid root. When I made this discovery, I felt that I had found the culprit in the lateral incisor. In an effort to take its position in the arch, it had pitted itself against the weaker deciduous tooth, lateral incisor was pressing against the cuspid root, which caused a resorption that I am sure will result in its early exfoliation. I am following this case to see what will happen, making examinations once a month.

With this case, I felt that my evidence was complete, and that I had proved, to myself at least, that ectopic eruption of the lateral incisor was causing the premature loss of these cuspids, which in turn caused a specific type of malocclusion.

What can we do about these cases? Should we go on observing them, hoping that nature will correct them, or should we institute orthodontic treatment? In a paper now awaiting publication, I made

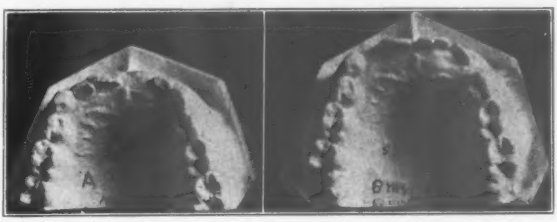

Fig. 8.—Two models of same case taken five months apart. The eruption of the left maxillary lateral incisor has caused the early loss of the left cuspid. The right cuspid was loose in the model to the right.

weakening its attachment and finally causing its exfoliation, with resulting malocclusion. The stimulus for the resorption came from the erupting lateral incisor.

Having made this observation, I was eager to look for the same process in the maxilla. I soon found a case. Figure 8 shows the upper models of a case, taken five months apart. In the first model, you will note the presence of the left cuspid. In the second, it has been lost, though there was no caries nor trauma. I then took roentgenograms on the right side to see what was happening. Figure 9 shows what I found. The unerupted

the statement that intercuspid growth is necessary if the incisors are to aline themselves to normal occlusion; that where normal alinement occurs, there is a good increase in the intercuspid space, though incisor spacing is not necessarily a part of the process; that, in those cases wherein the lateral incisors erupted lingually, and did not show a tendency to move by themselves into normal alinement, the intercuspid increase was either very small or lacking entirely. This, then, seems to be a very important diagnostic point in determining whether orthodontic treatment should be instituted early. It is not the only point, for

such roentgenographic evidence as I have shown you is an important adjunct in the diagnosis. Further, it may be necessary to observe the case for a time, and the interval between observations should not be longer than two or three months. In addition to the observations, accurate records should be made, including good models and small roentgen films, such as those manufactured by the Buck X-Ograph Company.

Fig. 9.—Right side of right hand model in Figure 8, showing resorption of deciduous cuspid root by ectopic eruption of permanent lateral incisor. The high position of the permanent cuspid and lack of resorption of the apical area are to be noted. The deciduous cuspid was shed two weeks after the roentgenogram was taken.

In the case shown in Figure 7, I decided to institute orthodontic treatment after a period of observation. I realized that the right cuspid was being resorbed and was rather loose in its socket, but I felt that if I could maintain this space, I could at least prevent the loss of the space even though the cuspid would be lost a little earlier through orthodontic interference. I therefore placed a simple expansion arch, and with ligatures moved the cuspids buccally and rotated and alined the incisors. Figure 10 shows two stages of the treatment. After the incisors were alined and the cuspids shed, I observed the case, using no retention whatever.

Figure 11 shows the roentgenograms of the cuspid roots during treatment. Though they were shed shortly after these roentgenograms were made, you will note that the resorption seems more typical at this time. The interesting point is that the incisors are now perfectly alined and in good occlusion, and the permanent cuspids are erupting quite normally. This seemed to me a much better procedure than taking a chance that a disorganizing deformity, such as we have all seen, should occur. In attacking the problem so, I felt that I was in fact practicing preventive orthodontia. And certainly I am now more suspicious than formerly of ectopically erupting incisors.

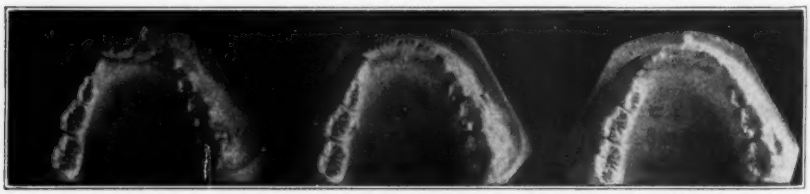

Fig. 10.—Two stages of treatment in case shown in Figure 6. No retention was used and in the right hand model, the permanent cuspids are erupting normally.

But the problem remains as to how we can see more of these cases in time to do

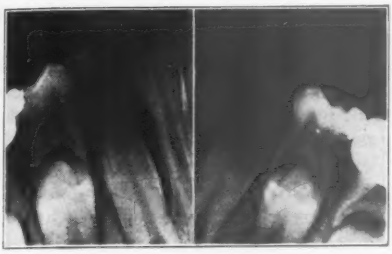

Fig. 11.—Roentgenograms of Figure 10, center, showing normal resorption of deciduous cuspid roots during treatment. Figure 7 was taken before treatment was started.

Fig. 12.—Two cases showing ectopic eruption of maxillary first permanent molar causing early resorption of second deciduous molar. The upper model is from the collection of Dr. Wolfsohn, of San Francisco. In the lower model, the deciduous molar was shed shortly after the model was made.

something about them; for, as a rule, the orthodontist sees them only after the damage has been done. The only solution, as I see it, is to show the evidence to dentists in general and in pedodontic practice and to pediatricians, and to urge them either to make these observations themselves or to send them to an orthodontist who can make the necessary appraisals of growth processes. In other words, we should urge on parents and practitioners the need for earlier examination of children; that is, we should utilize and advance the idea of prophylactic orthodontia. Whether this idea is furthered will depend on us.

There is another type of ectopic

Fig. 13.—Roentgenogram of lower model in Figure 12, showing type of resorption produced by ectopic eruption of permanent molar.

eruption that causes not only premature loss of the deciduous teeth but often, as well, a malocclusion that is disfiguring both esthetically and functionally. I refer to ectopic eruption of the first permanent molar. I believe that you have all seen this type of case, for I received no less than six records of such cases from men to whom I sent a questionnaire. The results are not always the same. Sometimes, the deciduous second molar is shed prematurely. In other cases, there is a partial resorption of the deciduous molar roots, and, as a result, the erupting

permanent molar apparently stops in its track. Figure 12 shows two such cases, one from my own collection and the other from that of Dr. Wolfsohn, of San Francisco. In the case from my practice, there was a premature loss, the tooth fairly hanging by a thread when I first saw the child. Figure 13 shows the roentgenogram of the case, and Figure 14, the tooth after it was shed.

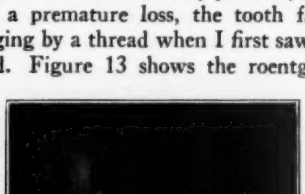

Fig. 14.—Second deciduous molar, which was shed early. The tooth is seen in the lower model in Figure 12.

Fig. 15.—Roentgenogram loaned by R. C. Willett, showing early loss of second deciduous molar due to ectopic eruption of permanent molar. It also shows the method used by Dr. Willett to guide the malerupting molar into normal position.

These cases, while not so common as those of the first type that I have discussed, are nevertheless common enough to call for more careful observation during this early developmental stage. Just why this sort of ectopic eruption occurs I do not know, but the solution does not seem to be impossible in view of the evidence that we now have on the process of root resorption and tooth eruption.

In a letter that I received recently, Dr. Willett offers a possible explanation for the anterior migration of the first permanent molar. He writes:

> I have been pondering over the cause for the anterior migration of the first permanent molar and its action on the second deciduous molar in some cases. I wonder if it does not occur because the alveolar process in that region is soft in proportion to the density of the overlying gum tissue, and the first permanent molar floats in the way of least resistance until it breaks down the thin wall of process between it and the roots of the second deciduous molar.

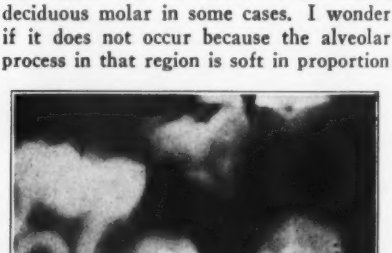

Fig. 16.—Ectopic eruption of mandibular permanent molar causing early resorption of roots of second deciduous molar. (Loaned by Dr. Willett.)

Dr. Willett sent me roentgenograms of such a case (Fig. 15). The second deciduous molar, he said, had been jacked up until the boy could not comfortably close his teeth until it was removed. It is interesting to see how ingeniously Dr. Willett has applied the principles of space maintenance to control the eruption of the first permanent molar.

Dr. Willett's theory as to the cause of this migration seems worthy of further investigation. It is well known that during the eruption of the teeth, there is an increase in vascularity of the bone surrounding the erupting tooth. This means that the bone is much softer than usual, and dissociations of growth may occur more frequently than we suppose.

In cases of this type, two kinds of treatment are possible. If the permanent molar has not erupted, the deciduous second molar should be extracted, and such an appliance as Dr. Willett uses should be placed to guide the molar into position. On the other hand, if the molar is partially erupted, an appliance that will effect a distal movement of the offending permanent molar must be placed. In my own practice, I either band the tooth and use an intermaxillary extension that will not only move the molar distally, but tip it as well, or use a modified jackscrew arrangement. Dr. Willett uses a very ingenious appliance in this type of case.

We see the same type of eruption in the mandible as is shown in Figure 14 in the maxilla. I have seen only a few such cases and believe that they are rarer than those in the maxilla. The treatment called for is the same (Fig. 16).

Surely there are other types of ectopic eruption causing the early loss of other deciduous teeth, and it is only by close observation in clinical practice and observation groups that they will be discovered. Our search for such cases will be fruitful if we will all make more frequent and intelligent use of observation methods and the roentgen rays.

In this paper, I have only scratched the surface of an important problem. Yet a start has been made, and Dr. Willett and Dr. Gurley and other men among you who have made careful observations and carried an exhaustive research will do much in the future to solve this problem of the etiology of premature loss. I have material for further studies, which I will present for consideration from time to time. There are many phases of this problem besides that of caries and its sequelae, and the only plausible method of attack is from the standpoint of the intricate processes of growth and development, and through the practice of a true preventive orthodontia.

308 David Whitney Building.

A REVOLUTIONARY MECHANICAL PRINCIPLE UTILIZED TO PRODUCE FULL LOWER DENTURES SURPASSING IN STABILITY THE BEST MODERN UPPER DENTURES*

By SIDNEY C. FOURNET, D.D.S., and CHARLES SHEPARD TULLER, D.D.S.,
New Orleans, La.

THE successful stabilization of full upper dentures was accomplished many years ago, but until the advent of the full lower denture to be described here, the lower denture has universally defied successful stabilization. We are prepared to demonstrate that full lower dentures may now be made that can be removed from the mouth with difficulty, even by the wearer. They are more stable than good upper dentures, yet they can be worn with comfort and satisfaction and complete absence of irritation. Neither small seed nor any other kind of food ever gets under one of these lower dentures. Their stability is almost equal to that of natural teeth.

We have completed more than twenty-five of these cases without a failure. Mouths of every description have been fitted, with practically uniform success. We are still unable to find a case too bad to be satisfactorily fitted and do not yet know just how bad a case must be to register a failure. Some of the dentures have been worn three and one half years without any perceptible loss of anchorage.

Although these plates cannot be dislodged by any of the usual cuspal irregularities or badly located teeth, we continue to advocate the elimination of cuspal interference in the interest of healthy mucous membranes and the preservation of alveolar ridges. When cuspal interference does result in dislodgment, the usual order of things is reversed, and the upper denture will be displaced by the lower.

One of us (S.C.F.) discovered the basic principle of this technic, and, in 1931, he achieved real mechanical stability. Our joint efforts have since been directed to developing its utmost possibilities and making its application practical and universal.

Among the factors in the failures of the past are the time-honored method of arbitrarily delineating the position and form of the denture edge, imperfectly adapting the edge by means of knife and scraper, excoriation and chafing the mucous membranes by loose movable dentures, attempting to use atmospheric seal without mechanically locking the denture in one position, using dentures that were far too small and short, and, in fact, failing to make use of all the hard and soft tissue anchorage available.

The technic here described establishes complete stability by utilizing areas on the mandible never before successfully occupied simultaneously. By our method, the denture is firmly locked in position by unchanging bony buttresses that absolutely prevent anteroposterior and lateral movement. Neither can it be tipped in any direction. It may be disturbed in an upward direction only; which, in turn,

*Read before the Section on Full Denture Prosthesis at the Seventy-Seventh Annual Session of the American Dental Association, New Orleans, Nov. 7, 1935.

is prevented by developing an atmospheric seal. Every edge of this denture is completely, definitely and scientifically muscle molded and is exact in length, contour and thickness for each individual patient. Nothing is left to chance. This automatically enlarges the area of contact and greatly increases the effectiveness of the atmospheric seal. Thus, by utilizing all the available hard and soft anatomic features of the mandible, we can produce comfortable lower dentures that are practically immovable. Excoriation of soft tissues is eliminated by careful adaptation of edges and complete immobility.

A stock lower impression tray too large for the case is procured. With pliers, the heels are bent upward and the distal end of the buccal flange is bent outward. With high fusing modeling compound, an impression that includes the anterior face of the ramus and all other bony prominences is secured, including the external oblique and mylohyoid ridges. Upon a cast from this impression, a vulcanite tray or base that extends to its edges is constructed.

This tray is trimmed by the cut and try method until the proper outline is secured. This includes paralleling the external oblique ridge to but not into the bicuspid area. The bicuspid and labial edges are trimmed until no muscle interference is encountered. Lingually, the edge is extended below the mylohyoid ridge and trimmed until tongue motion does not lift the tray. In the region of the lingual frenum, the edge is widely trimmed until the tongue can move with complete freedom without displacing the tray. The heels extend up the anterior face of the ramus about one half inch above the body of the mandible. The tray should now have stability without suction. If the tray has suction, an edge or certain edges are too long and need further shortening. A tray that has suction cannot take a correct impression. When the correction is made, all edges are smoothed and rounded, and the tray is ready for the final impression.

Low fusing modeling compound is now used to secure the final impression. It is evenly distributed on the vulcanite tray and placed in the mouth under even pressure, removed without chilling, examined to see that distribution is even, then heated and returned to the mouth under uniform but less pressure. It is removed without cooling and examined again to see that the compound extends over all tray edges. If the tray shows through, the process must be repeated. It is heated again, returned to the mouth and held with gentle pressure, the patient being instructed to raise the tongue to the roof of the mouth and protrude it as far as possible, It is then chilled with ice water, removed and examined to see whether the floor of the mouth has folded the distolingual border forward and upward. If not, compound is added with a tracing stick and the tongue movements are repeated until definite molding or muscle trimming is evident. On the buccal edges, the compound is heated (with a small blow torch), placed in the mouth and held down with the fingers of one hand, while the cheek is forcibly drawn up over the edge, carrying the surplus compound onto the top of the tray. This is repeated as necessary. In the bicuspid region, the same procedure is followed and, after the compound is again heated, the patient is instructed to make all the lip and cheek movements possible. This insures good muscle trimming in the bicuspid area. The procedure is repeated in the incisor-cuspid region.

On the lingual aspect, the distal border is again heated and the compound placed in the mouth, and the tongue is thrust forward and upward as far as possible.

This is repeated in the bicuspid area and also in the incisor area, the operator making sure that the lingual frenum has ample room for unobstructed movement in all directions.

Now it is tested for suction with the tongue raised against the roof of the mouth. If the technic has been correct, the impression will be immovable. The tongue is lowered as much as possible and a test for suction is made. If the impression does not hold, a little compound is added with the tracing stick to the lingual flange in the bicuspid area, and the patient is asked to raise the tongue. Suction should now be established with the tongue lowered. If not, the process is repeated. The impression should now be perfect and resist at least a 5-pound upward pull regardless of the tongue position.

Failure in normal cases is generally attributable to the fact that the flange is too short on the lingual side in the bicuspid area, or that there is insufficient extension up the face of the ramus or inexact approximation of the external oblique ridge. The tracing stick is applied alternately to these edges and muscle molding establishes stronger suction. All edges must be round, smooth and thick. Melted carding wax is thinly applied with a brush as a final edge finish and the impression is again carried into the mouth to correctly mold the applied wax. Thin knife edges cannot be used. This applies with emphasis to the finished denture.

Difficult cases include those in which there are rami with an angle more obtuse than 90 degrees and those in which the mylohyoid muscles are so flabby and loose that an excessive range of movement prevents the securing of an atmospheric seal in all tongue positions, as well as those with too short a frenum linguae, which greatly restricts the tongue tip. Although the results in such cases are not ideal, they are good, and better than those obtainable with many other technics.

The following are basic factors in the success with the technic here outlined:

1. The discovery and use of ample bony boundaries to stop all movement of the lower denture, except in an upward direction.

2. The inclusion of a larger area of the mandibular surface than was ever successfully and comfortably covered before.

3. The perfection of an atmospheric seal sufficient to make dislodgment of the denture practically impossible.

4. The establishment of the principle that successful atmospheric seal is primarily dependent on immobility of the base. Any movement of the base breaks the atmospheric seal.

5. The abandonment of the time-honored practice of manual delineation of the periphery and the substitution therefor of scientific muscle molding of the periphery.

6. The prevention of abrasion of the membranes by correct muscle molding of the periphery and complete immobility, which eliminates frictional chafing.

7. The classification of the three positions of the floor of the mouth to aid in muscle molding of the lingual periphery.

8. The delineation of the external oblique ridge for 10 mm. up the face of the rami as the definite landmark on which to establish the distobuccal border of the muscle molded denture.

The fact that one of these dentures has been worn for a period of three and one-half years and retains its maximum retention is in itself revolutionary. We therefore feel justified in asserting that we have presented new, original and scientific principles in efficient full denture prosthesis.

729 Maison Blanche.

FUNCTIONAL IMPRESSIONS FOR REBASING FULL DENTURES*

By VICTOR H. SEARS, D.D.S., New York City

THE rebasing of artificial dentures is by no means a new thing, but so many distortions have accompanied the procedure both in the patient's mouth and in the subsequent completion of the laboratory operations that it has been used rarely by some dentists and entirely abandoned by others. This condition is unfortunate. From the theoretical point of view, rebasing is a most logical means of approaching perfection in adapting the denture base to its supporting tissues; from the practical standpoint, we generally have fallen far short of the theoretical perfection. Evidently, there is something faulty with technic that cannot assure a visualized and attainable result.

An awareness of possible pitfalls will help us to avoid them. The phases that usually cause trouble in the mouth are loss of occlusal relation and improper distribution of pressure on the supporting tissues; the most common fault in the laboratory is too great closing pressure on the flask. These discrepancies are often scarcely noticeable until the refitted denture is returned to the patient's mouth, but they are the source of much disappointment.

The two major problems in the patient's mouth are (1) to preserve centric occlusion in centric jaw relation and (2) to control the adaptation of the base to the tissues.

*Read before the Section on Full Denture Prosthesis at the Seventy-Seventh Annual Session of the American Dental Association, New Orleans, La., Nov. 5, 1935.

Any attempt to place under the denture base a mass of impression material such as either sluggish modeling compound or freely flowing plaster introduces a definite hazard to the occlusion. With freely flowing materials, there is the possibility of rotation or side-shift, especially on the softer and flatter alveolar ridges; with sluggish impression materials, there is the additional danger of uncontrolled and undesirable distribution of pressure on the different areas of the supporting tissues. Any procedure, to be acceptable, must deal rationally with these hazards.

No consideration will be given here to the moot question as to which kinds of mouths should receive pressure impressions and which should be recorded in fully relaxed condition, but it should be observed that rebasing infers some pressure. In those rare cases in which the ridge is soft and resilient only in the regions of the second bicuspids and first molars, this technic should be substantially modified, but the principle of controlled pressure distribution is always indicated when pressure is used.

Let us then consider first the matter of distributing the pressure over the various areas that support the bases; for, if any pressure at all is to be applied, there must be a right and a wrong way of distributing it. The right way is to apply comparatively little pressure over the soft yielding areas. Failure to observe this rule has caused many dentures to be looser after the rebasing operation

than before it. In fact, dentures are pushed away from the ridges because of the tendency of displaced tissue to resume its original position.

Too much pressure on the resilient tissue of the palate just linguad from the alveolar ridge or any other resilient tissue will force the denture away from the seating surface, but the most frequent trouble from displacement of tissue is that caused by the upward force of overly pressed tissues in the extreme distal areas of the basal seat of the mandibular ridge. This sometimes develops as a result of alveolar ridge atrophy, but quite often it is due to excessive pressure on the resilient tissue during the rebasing operation. Obviously, sluggish materials such as modeling compound or wax will displace such yielding tissues more than the freely flowing substances used as impression materials, but even the latter, when used alone, are a source of danger in this respect.

A fairly well-fitting base, especially if the border adaption is good, will confine even the freely flowing materials sufficiently to displace the yielding portions of the tissue support. The knowledge of this fact furnishes the first clue as to how we should govern the distribution of force during rebasing. For a more complete solution of the problem, it is wise to consider how the pressure is to be applied to the opposing masticatory surfaces of the teeth with the denture in function. It also should be remarked that the full benefit of this technic is possible only when suitable posterior tooth forms are properly placed.

Elsewhere,[1] it has been explained why, in centric and lateral occlusion, there should be no contact at the anterior and posterior extremes of the denture bases. To secure the desired bearing, it is necessary to distribute the closing pressure during the rebasing operation as it will later be distributed in the completed dentures during mastication. The ridge areas underlying, in general, the bicuspids and first molars should receive more pressure during the final stage of the rebasing impression in the patient's mouth than do the other areas. This is easily accomplished by using a combination of sluggish and freely flowing materials, as will be presently explained. While the technic to be suggested applies to dentures in general, the maximum benefit is to be obtained only if the occlusion is worked out according to good engineering principles.[2] To simplify the discussion, let us assume that the occlusion of the teeth is satisfactory and that only the adaptation of the bases will need improvement.

CHAIR TECHNIC

The way to preserve the established occlusion is to place the lining on the tissue-bearing surface of the denture in a uniform and very thin layer. If, for instance, we closely adapt a layer of 28-gage wax over the entire inner surface of the base and, with this wax slightly warm, cause the patient to bite firmly, there will be no danger of shifting the teeth out of centric occlusion. Likewise, if we adapt the even layer of thin wax over any corresponding areas on both right and left sides, the occlusion will still be preserved. In fact, the close adaptation of a thin even layer of wax over right and left alveolar ridge areas underlying the two bicuspids and the first molars constitutes step one in the procedure. On the upper denture, the wax on both the right and the left side

1. Sears, V. H.: Securing Occlusal Balance, D. Survey, 11:33 (Aug.) 1935.

2. Sears, V. H.: Some Fundamental Factors in Tooth Articulation, J. D. Res., 8:337 (June) 1928; Full Denture Procedure, New York: Macmillan and Co., 1929.

is carried over onto the buccal surface and well down toward the teeth, where it is sealed to place with a hot spatula. It is not carried across the palate, but is cut off so that it will make contact only with the alveolar ridge. On the lower denture, the sheet of wax is carried over the borders both on the buccal and on the lingual surfaces, so that it may be sealed firmly in position. The edges of the sheet of wax fitting against the supporting tissues may be beveled so that there will be no distinct step where the wax begins. Placing the thin wax in this manner assures, at the same time, both the preservation of centric occlusion and the application of pressure of the required areas.

Step two consists in removing with a bur the exposed areas of the base from the ridge surfaces not covered by the wax, to a sufficient depth that they will make no contact with the tissues. It is important to leave the wax surfaces undisturbed because they are necessary to key the impressions and thus preserve the occlusal relations.

Step three consists in filling the tissue side of the denture with a freely flowing mixture of impression material and causing the patient to hold the teeth (and therefore the dentures) together until the mix becomes set. In this manner, the occlusion is preserved and the greater pressure is placed on the areas that should receive it. With the teeth in occlusion, the buccal and labial borders can be limited according to the technic of Valbuena.[3]

The chair technic, together with the reasons behind it, has been given in its simplest form. It will, of course, be applied with slight variations according to the needs of the case and according to the practices of the individual dentist. To provide for a sharp ridge, for example, the wax should be removed over the crest so that less pressure will be applied here. To prevent the dislodging force of tissue under pressure, no excessive pressure should be placed upon resilient areas, wherever they may be. If the border extensions in height or width are unsatisfactory, they should be corrected with wax or modeling compound before the freely flowing mix is used to complete the impression. The excellence of results will, of course, always be dependent on the skill and care of the operator.

3. Valbuena, Louis: Bucco-Labial Muscle Limited Impression Technique, D. Items Int., 57:832 (Sept.) 1935; Muscle Limited Lower Impression Technique, ibid., 57:939 (Oct.) 1935.

LABORATORY TECHNIC

The laboratory part of the procedure is of greater importance than is usually conceded. If no change in vertical dimension is contemplated, a Hooper duplicator is the instrument of choice; if the jaw separation is to be increased, a sturdy articulator should be used. Accurately fitted flask parts are essential, with no shift or teeter between the upper and lower halves. Inspection and any necessary adjustment should be made each time the flask is used.

With proper flasks, there is still the danger of distorting the occlusion vertically. Great closing pressure will force the teeth into the investment, and this or any position short of full closure will raise the teeth farther away from the cast. While it is often tried, it is practically impossible accurately to rebase dentures with a thin layer of rubber or with any other material that is sluggish at the time the flask parts are pressed together. The phenol resins are materials of choice at the present time for rebasing on vulcanite or other thermoset materials, because they become fluid before curing has set them. It is advisable to keep the flask under continuous

spring pressure while the resin is being cured.

Several questions suggest themselves. For instance: If this technic yields such satisfactory results for rebasing, why not apply the same principle to the original impressions for new dentures? The answer is that the principle does give equally good results for either first impressions or for rebasing completed dentures.

Suppose the operator desires to open the jaw relation, the thin layer of wax will not accomplish this. Should the thickness of the wax be made greater? No, because this would endanger the loss of relation between ridge and teeth. Increasing the degree of jaw separation may be accomplished by inserting a roll of soft wax between the opposing occlusal surfaces.

But suppose the centric jaw relation is not known to be correct: The rebasing technic is the same except that the opposing casts should be oriented by means of one of the needlepoint tracing devices[4] mounted on well-fitting bases at the desired degree of jaw separation.

In step number two of the chair technic, why cut away the surface underlying the incisors? Is not greater stability obtainable by extending the pressure all along the ridge to the median line? This would be true except for the fact that this area, when pressure becomes too great, becomes a fulcrum, so that the denture tends to teeter when pressure is exerted only on one side. Clinical experience indicates that the relief of pressure here in both maxillary and mandibular bases is as important as the relief of the hard palate center in the maxillary base.

Is there sufficient superiority in the results from using a combination of sluggish and freely flowing materials to justify the additional time? Yes. Furthermore, the additional time with the patient in the chair is not great for this rebasing operation and may be less after the rebasing dentures are delivered.

What impression material is suitable for step three of the chair technic? Any of the freely flowing impression materials may be used, but certain advantages are possible with the oil-paste mixtures. These pastes adhere well to the denture base, which is important where the layer is thin. They flow readily and set reasonably soon after the form of the impression has been completed; they do not mix with the oral secretions, which is especially advantageous on the lingual border of the mandibular base, and they reproduce the surfaces of the tissues with great fidelity.

A little experience will develop the operator's individual refinements and indicate to him the value of this procedure for rebasing full dentures. The principle may be then extended to saddle areas on partial restorations and to impressions for new dentures.

4. Sears, V. H.: Steps in Taking the Bite, D. Survey, 11:31 (April) 1935.

SUMMARY

1. Unscientific rebasing methods are causing disappointment, and rebasing is consequently being omitted in many cases wherein it is indicated.

2. An understanding of the difficulties will help to overcome them.

3. The two major problems are the preservation of centric relation and satisfactory adaptation to the tissues.

4. Control of pressure in the impression should be determined by a knowledge of the comparative resiliency of the tissues and by an advance knowledge of where the occlusal force is to be applied in the finished denture.

5. Occlusion is maintained and variable pressure controlled by the use of thin

and even layers of sluggish material followed by free-flowing material.

6. Laboratory devices must be accurately fitted and the processing technic carefully carried out.

7. The technic is susceptible to modification according to the requirements of the case.

8. The principle underlying the technic is applicable to other procedures than full denture rebasing.

200 West Fifty-Ninth Street.

OSTEONECROSIS OF THE MAXILLA: REPORT OF CASE*

By OATHER A. KELLY, D.D.S., St. Louis, Mo.

HISTORY.—A man, a department manager for thirty years, aged 50, gave a negative history as to illness except an osteomyelitis of the left mandible in 1917 terminating in a pathologic fracture that healed uneventfully and resulted in no deformity. A molar tooth in the right maxilla became loose in October and was removed by a dentist. No soreness followed and the patient did not return for observation. In early November, 1932, other teeth became loose, and he visited another dentist, who removed them and referred the patient to me for consultation.

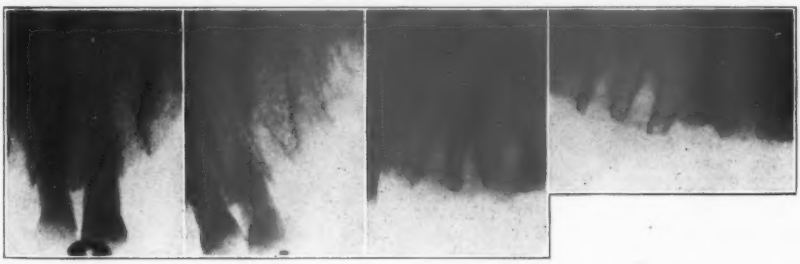

Fig. 1.—Intra-oral roentgenograms showing sclerotic condition of bone. There is no rarefaction, although a profuse purulent discharge is present. (November, 1932.)

Examination.—There was a marked inflammatory condition in the soft tissue covering the alveolar ridge, the swelling increasing the ridge to twice its normal width. The soft tissue was apparently detached from the bone on both buccal and palatal aspects and pus was discharging from underneath the flaps. The inferior surface of the alveolar ridge on the right side was exposed from the third molar to the bicuspid area and was necrotic in appearance. The bone was not painful to touch. The roentgen-ray examination was negative except for an apparent increase in the density of the bone and the presence of an impacted left third molar. Only two other teeth remained in the maxilla, the two central incisors.

The patient complained of no pain. The temperature was 98.6. A very foul odor emanated from the mouth. The condition

*Read at the Seventeenth Annual Meeting of the American Society of Oral Surgeons and Exodontists, New Orleans, La., Nov. 1, 1935.

Fig. 2.—Right extra-oral roentgenogram. The impacted left maxillary third molar was not involved in sequestrum. (November, 1932.)

Fig. 3.—Left extra-oral roentgenogram.

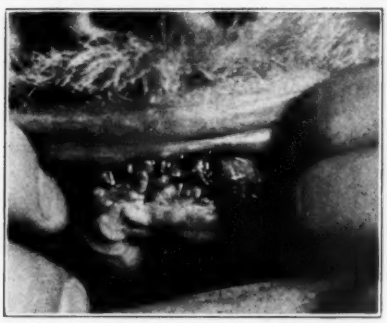

Fig. 4.—Appearance a few days before sequestrum was removed. (May, 1933.)

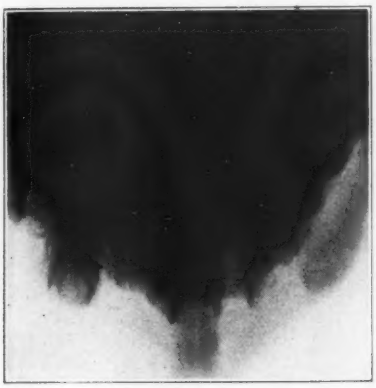

Fig. 5.—Roentgenogram taken immediately before sequestrum was removed. (May, 1933.)

Fig. 6.—Nasal surface of sequestrum. The floor of both antrums is included.

Fig. 7.—Palatal surface of sequestrum.

was easily recognized as atypical, but a tentative diagnosis of osteomyelitis was made.

A complete physical examination by Robert Burns, M.D., gave no significant information and was essentially negative. The Wassermann and Kahn tests were negative.

Culture on Loeffler's bacilli showed streptococci to be the predominating organism and culture on the blood revealed nonhemolytic streptococci and staphylococci.

The patient stated that he had been drinking a so-called radio-active water for more than a year. He had also been taking, at frequent intervals for a long period of time and in undetermined quantities, tablets in a bottle bearing the following formula:

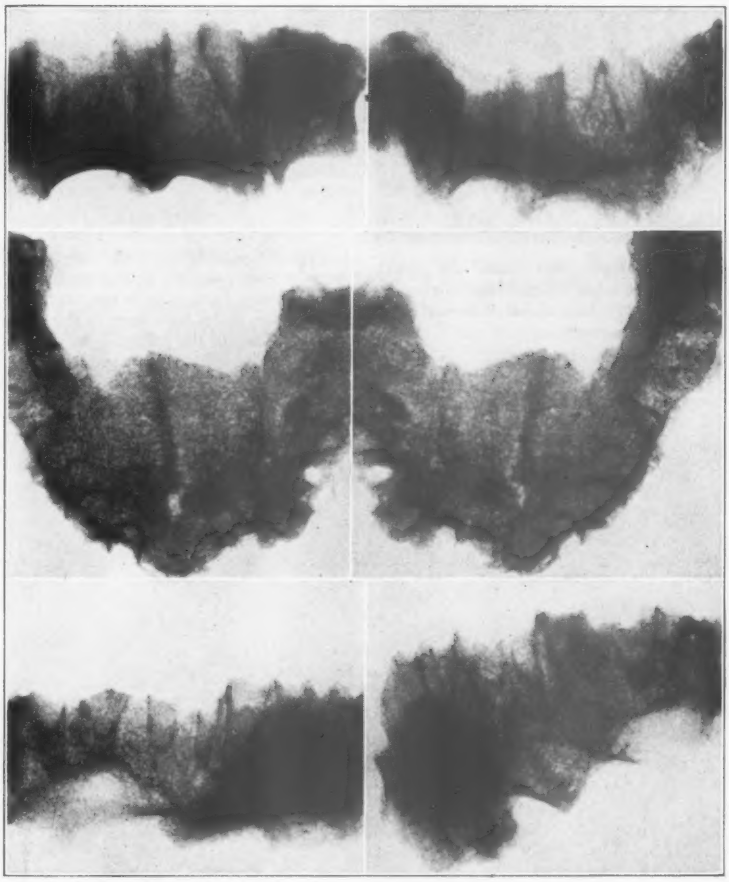

Fig. 8.—Roentgenographic study of sequestrum. The bone is sclerotic in appearance.

The blood showed 3,880,000 erythrocytes, 11,700 leukocytes and 63 per cent hemoglobin. Direct smear from the mouth gave gram cocci in pairs.

Fig. 9.—Roentgenogram made one month after removal of sequestrum. The bone spiculae were probably laid down before the sequestrum was removed.

Fig. 10.—Roentgenogram made twenty-nine months after removal of sequestrum. There is definite bone formation in the anterior maxillary region and a bone spur in the remnant of the soft tissue of the palate.

Fig. 11.—Patient twenty-nine months after removal of sequestrum.

	Gr.
Ext. damiana	2
Ext. nux vomica	$\frac{1}{8}$
Phosphorus	$\frac{1}{100}$

The so-called radio-active water was obtained by immersing an earthenware jar containing so-called radium ore in an air-tight jar of water. An analysis of this water by the U. S. Department of Agriculture, Food and Drug Administration was as follows:

The generator was immersed in 1 gallon of water contained in an air-tight vessel. It was exposed to the water for nineteen hours, at the end of which time the water was found to contain 1.2 millimicrograms of radon per liter. (The patient was using two generators in his jar.)

Treatment and Operation.—The patient worked continuously while under treatment until the sequestrum was removed, with the exception of one day when he developed a laryngitis. The treatment consisted of irrigations, merely to keep the mouth as clean as possible, maintaining adequate drainage and ordinary care as to diet and elimination.

The patient was kept under observation six months before any mobility could be detected in the dead mass of bone. The entire inferior border of the alveolar process became exposed from the right tuberosity to the left second molar area. The soft tissue became surprisingly healthy in appearance as drainage occurred, not through the tissue but between the flaps and the bone. May 25 (six months and twenty days after initial examination), the patient was admitted to the hospital and anesthetized and the sequestrum was removed. The area of necrosis involved the palatal process, including the floor of the nasal cavity, the floor of both antrums and the entire alveolar ridge except the left tuberosity.

Outcome.—The necrotic bone was completely detached from the other tissue. The vessels and tissues that normally pass through the nasopalatine canal were completely obliterated. The membranes lining the antral and nasal cavities were intact and covered with epithelium and no perforation was present.

There was no further discharge from the wound. The patient returned to work six days after admission to the hospital with no further symptoms of a disease condition.

Eleven months after the sequestrum was removed, the impacted left third molar was removed under procaine anesthesia. Healing occurred without complications.

Twenty-nine months have elapsed since the sequestrum was removed. The tissue of the mouth is healthy in appearance and the patient is apparently in good health. No artificial denture has been constructed.

University Club Building.

GENERAL ANESTHESIA IN DENTAL AND ORAL SURGERY*

By HARRY M. SELDIN,† D.D.S., New York City

EVERY dentist who administers general anesthesia takes his patients through the mysterious portals of life and death. He must therefore be a student of life itself, and of those chemical, physical, biologic and physiologic phenomena that constitute life. He should have a knowledge of the possible pathologic changes in the vital organs and of the effect of anesthesia on these organs.

Though the dental anesthetist is not expected to be an internist, he should have an understanding of the heart and what he may expect of it, in order that he may anticipate trouble, know how to prevent it and be able to cope with it when it does occur. Administration of the anesthetic agent may carry the body cells into a state of approaching death and may so depress an impaired organ that it can return to a normal state only through repair. Constant study and observation will increase our knowledge and thus safeguard the patient.

SELECTION OF THE ANESTHETIC AGENT

Several new anesthetic drugs have recently been introduced, each one being energetically promoted by its manufacturer, whose claims should be accepted only with caution as the natural enthusiasm of the merchant trying to sell his product. The office use of any drug as an anesthetic agent should be accepted only after it has stood the tests of time and trial by reputable pharmacologists, physiologists and anesthetists and has been approved by the Council on Dental Therapeutics. The three most prominent of the new agents deserve brief reviews.

Cyclopropane.—Administration of cyclopropane, in concentrations of from 4 to 13 per cent, with oxygen, will produce narcosis. It is believed to cause respiratory failure in concentrations of about 40 per cent. Cyclopropane is therefore a very powerful anesthetic. Waters and Schmidt[1] have noted that its administration is more likely to produce tachycardia, severe drop in blood pressure and shock than is that of the accepted older anesthetics. It produces more postoperative nausea than does administration of ethylene, and much more than nitrous oxide anesthesia. The absorbing capacity of the body tissues is much greater for cyclopropane than for ethylene, and greater for ethylene than for nitrous oxide. A high tension is consequently present in the tissues for several hours after administration of cyclopropane, a lesser tension with ethylene, and practically no tension with nitrous oxide. Cyclopropane is inflammable. It is therefore contraindicated in routine surgical procedures in dental offices.

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†Consulting Oral Surgeon, Harlem Hospital.

1. Waters, R. M., and Schmidt, E. R.: J.A.M.A., 103:975 (Sept. 29) 1934.

Vinethene or Divinyl Oxide.—Divinyl ether has a potency several times that of ethyl ether. Its administration produces less irritation and it is absorbed and eliminated much more quickly than ethyl ether. It is therefore a synergist of great value for use with gas oxygen. If the gases are administered under pressure, as in operations in the oral cavity, the flow rate of the gases through the divinyl ether would be so rapid that large quantities of this drug would be wasted, because of its great volatility. Divinyl ether is inflammable, and the danger of explosion is comparable to that of ether. It is therefore contraindicated as an anesthetic in the dental office, if spark-emitting devices are present. Though vinethene is a much inferior anesthetic to nitrous oxide for routine surgical procedures in the dental office, it can be used to advantage in emergency oral operations in private homes. If used with caution as to its explosiveness, it will prove to be superior to and safer than ethyl chloride.

Sodium Evipan.—Of all the barbituric acid derivatives, sodium evipan is asserted by some to be the most suitable for intravenous anesthesia. Sleep is produced very rapidly, and the drug is eliminated from the body mainly by detoxification through the liver. It is the sodium salt of N-methyl-cyclo-hexenyl-methyl and barbituric acid. It is used in freshly prepared 10 per cent aqueous solution, which is injected slowly into the antecubital vein. The maximum single dose is 10 c.c. The height of the anesthetic action is reached on completion of the injection (from two to three minutes) and lasts about fifteen minutes. Being an intravenous anesthetic, it is not reversible, and administration is therefore dangerous. It produces a drop in blood pressure of from 15 to 20 mm. It should not be used in patients suffering from circulatory or respiratory disease, or in patients with impaired liver function, bladder disease or any pyogenic infections. In using intravenous evipan, the functional state of the kidney and liver must be considered, since failure of the drug's destruction may make a therapeutic dose act like a toxic dose. Postanesthetic excitement, sometimes of maniacal character, has been reported, and caution is required with alcoholic and plethoric persons. The patient does not become ambulatory for about one hour after induction and often for a much longer period. Though evipan is a good, quick acting anesthetic for short operations, its many disadvantages prohibit its use as an anesthetic in office oral operations. A consideration of all the newer anesthetics leads to the conclusion that the time proven nitrous oxide-oxygen is still the anesthetic of choice in oral operations.

Nitrous Oxide-Oxygen.—Suggestion and Premedication: Fear of the dental chair is a potent psychic condition that, in itself, may predispose to changes in, or actual disturbance of, body metabolism; and many patients are incapacitated psychically to a greater or less degree after oral operations. The advantages of working on a relaxed and cooperative patient are innumerable. Though sedatives help, they cannot be expected to take the place of intelligent psychic suggestion. Unwise administration of sedatives will, at times, make the patient lose normal contact with his environment.

Of all the disturbing psychic influences that the patient comes under, the worst is delay in the dental chair. The nervous patient should be guarded against this, receiving the attention of the dentist and his staff as soon as he is placed in the chair. Intelligent preanesthetic suggestion and the avoidance of delay are of greater value than are sedatives. Quick induction and suggestion during the induction of the anesthetic will overcome

the terror that many patients have of loss of consciousness. As yet, careful clinical comparisons have failed to demonstrate the theoretical superiority of dental anesthesia with premedication over that without premedication. Those who choose to employ barbiturates in office practice should consider the effects on the system of administration of these drugs. Samuel M. Gordon,[2] in evaluating the barbiturates for the Council on Dental Therapeutics, writes, "It is obvious that the use of the barbitals, as aids in systemic and local anesthesia, is fraught with a certain amount of danger, but here, as elsewhere, the practitioner should bear in mind that a drug is a two-edged sword, and that there is no such thing as a nontoxic sedative which may be used with impunity." Prof. Clinton H. Thienes,[3] in his study of barbituric acid derivatives, warns that all these drugs should be used with caution, and that the pharmacopeial preparations of barbital and phenobarbital or their sodium salts, are preferable to the more recently developed proprietary drugs. This is also the position stressed by the Council on Dental Therapeutics. The greatest advantage of premedication is the lowering of the rate of the patient's metabolism, and the resultant decreased demand of his tissues for oxygen.

SIGNS OF ANESTHESIA

I have found that, in the teaching of anesthesia, the novice has difficulty in coordinating all the signs of anesthesia. As these symptoms are numerous and somewhat confusing at first, time and experience are required to make one familiar with all of them. The selection of the most constant and reliable sign in each plane simplifies matters considerably for the beginning anesthetist.

During induction (first and second stage), the most reliable sign is the lid reflex, which remains active until the beginning of the third stage. As the patient enters the surgical stage, the lid reflex disappears, and the position of the eyeball then becomes the most conspicuous sign. During light and normal anesthesia (surgical stage), the eyeball assumes an eccentric position. This fixation of the eyeballs may be convergent, divergent, upward or downward. Usually, it is downward and inward. As the patient progresses into deep narcosis, the eyeballs become centrally fixed, and the most reliable symptom then becomes the breathing. During deep narcosis, the regular, rhythmic, machine-like breathing of the surgical stage changes to the stertorous type with its characteristic prolonged and jerky exhalations. These irregular sobbing respirations of the fourth stage become progressively more feeble and shallow until there is a cessation of breathing.

MAINTENANCE OF ANESTHESIA

Frequent swallowing is an indication of oxygen want. If it is not corrected by the addition of oxygen, retching and vomiting will follow. Sighs occurring every two or three minutes are a good sign, and indicate proper carbon dioxide stimulation. When they occur more frequently, especially when associated with short inhalations, they are indicative of oxygen hunger. Obstruction of an airway will prevent the regular intake of both nitrous oxide and oxygen, and thus will produce irregular anesthesia, culminating in asphyxia.

The sense of suffocation experienced by some patients is not due to fast induction, but to interference with either the

2. Gordon, S. M.: Intravenous Medication, J.A.D.A., 18:1787 (Sept.) 1931.

3. Thienes, C. H.: Preanesthetic Drugs, Anesth. & Analg., 13:80-85 (March-April) 1934.

inhalation or the exhalation of the gas. The inhalations are interfered with when the rate of flow to the inhaler is insufficient for the inspiratory capacity of the patient; that is, pressure or volume is too low. The expirations are interfered with when the exhaling valve is closed too tightly. The patient cannot then exhale with ease. In either case, the patient experiences the sensation of suffocation. This depressing sensation can be overcome by administering the gases with sufficient pressure, and by having the exhaling valve on the nasal inhaler open during the induction of anesthesia.

Patients suffering from nasal obstruction will experience the sensation of suffocation or drowning when the anesthetic is administered through the nasal inhaler. Inducing the anesthesia with the face inhaler and then changing to the nasal inhaler for the maintenance period, as advocated by William J. McLaughlin, of Bridgeport, Conn., will tend to eliminate the discomfort caused these patients.

Since the percentages of nitrous oxide-oxygen required to produce anesthesia vary with each type of patient, and also vary for the same person at different times, it is impractical to administer an anesthetic for oral surgical operations according to definitely predetermined mixtures. The improper use of the mouth pack, the accumulation of blood and saliva in the oral cavity and pharyngeal space, the pressing of the operator's fingers on the tongue, the incorrect position of the nasal inhaler, all are factors in anoxemia, factors that, by interfering with free respirations, reduce the arterial oxygen content so that a greater oxygen percentage has to be administered in order to overcome asphyxia.

Cyanosis, whether clinically visible or not, is found in the majority of gas-oxygen cases. Bancroft and his associates[4] demonstrated that cyanosis is present when the normal arterial oxygen content is reduced 10 to 15 per cent. In the majority of patients, the arterial oxygen unsaturation is more than 15 per cent before anesthesia is produced. No adequate proof has been brought forward, either clinically or pharmacologically, that such low grades of anoxemia, continued for the short time required for oral operations, are in any way detrimental to the patient.

BAD RISKS

A simple heart murmur, valvular lesions in a well-compensated heart without dyspnea, edema or pain on exertion will not affect anesthesia. Hypertension without symptoms can also be disregarded. Extensive valvular lesions are risky because of their effect on the heart musculature, causing cardiac exhaustion. Hypertension, associated with substernal pain or dyspnea, which is aggravated by exertion, should be handled carefully. Cardiac arrhythmia with a weak musculature is dangerous, and deep narcosis should be avoided in these cases. Preoperative rest and digitalization by the attending physician are indicated in all advanced cardiac cases.

Nephritics who have no cardiac lesions respond favorably to gas-oxygen anesthesia.

Gas-oxygen anesthesia should not be employed for the reduction of maxillary or mandibular fractures complicated with skull fractures.

The accidental passage of a tooth, vomitus or a sponge into the larynx or trachea will cause mechanical blocking of the airway and respiratory embarrass-

4. Raginsky, B. B., and Bourne, Wesley: Oxygen Content of Blood During Nitrous Oxid-Oxygen Anesthesia in Man, Anesth. & Analg., 13:152-155 (July-August) 1934.

ment. Oxygen under pressure will usually pass by the obstructed object and enter the lungs and blood stream, and the cough reflex will be restored. The patient will then usually automatically cough up the foreign body. Misplaced sponges can also be removed with curved pharyngeal forceps. If the cough reflex is not restored by forcing oxygen, and the foreign body is not dislodged, endotracheal administration of oxygen, with a soft rubber curved tube of the Magill type for nasal-laryngeal obstruction or oral intubation is advisable to overcome asphyxia. Tracheotomy has no place as an emergency measure in dental anesthesia. Intubation is much more efficient, easier to carry out and safer, and is nonmutilating.

RESUSCITATION

The early sign of deep narcosis is the jerking of the skeletal muscles. As asphyxia progresses, the body stiffens in marked tetanic spasms, and finally the body completely relaxes, and becomes flabby, and respiration ceases. Artificial respiration with oxygen under pressure will, in most cases, restore breathing. In the rare exception, where the patient fails to respond to the forcing of oxygen, we are confronted with the question as to how long resuscitative measures should be continued. Burns,[5] in his electrocardiographic study of apparent death and of resuscitation, showed that the electrocardiograph registered cardiac activity thirty minutes after pulsation and cardiac sounds had disappeared. Resuscitation should therefore be continued until at least one hour after breath and heart sounds have ceased by stethoscopic examination. Dr. Burns also observed that the mere administration of air mixtures with the pulmotor produced no reaction of the heart. He therefore concludes that artificial respiration with the pulmotor has no value as to the heart unless it is supplemented by energetic heart massage. The electrocardiogram revealed that pressure over the ribs in the region of the heart, such as is exerted in artificial respiration, produces electrical currents in the heart, and may thus serve to restore rhythmic contractions.

In such emergencies, it is therefore the duty of the dentist to stimulate cardiac and respiratory function by combining artificial respiration methods, such as the Schaffer technic, with oxygen under pressure until breathing is started, and, if unsuccessful, these measures should be continued for at least one hour after breath and heart sounds have ceased by stethoscopic examination.

As members of a humanitarian profession, let us not regard those who seek our professional aid as "cases," as "impactions," "cysts," "surgicals," etc., but rather as human beings who are, in most instances, nervous and apprehensive, and often pain-ridden. We can, with a humane, judicious induction of nitrous oxide-oxygen anesthesia, avoid the severe psychic disturbances that often follow oral surgical procedures, and make the patient's visit to the dental office devoid of fear. On the anesthetist depends the uneventful recovery of the narcotized person. There are no mysteries to the successful administration of gas-oxygen. The secret of success lies in a thorough knowledge of the subject.

5. Burns, O.: Munchen. med. Wchnschr., 81: 1225, 1934; Anesth. & Analg., 14 (May-June) 1935.

6. Seldin, H. M.: Practical Anesthesia for Dental and Oral Surgery, Philadelphia: Lea and Febiger, 1934.

THE PORCELAIN INLAY; DIRECT TECHNIC*

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THE porcelain inlay has been a subject of the greatest interest to me for more than a quarter of a century. It is indeed a subject that deserves the interest and attention of every member of the profession who is endeavoring, by the use of artificial means, to restore to usefulness and normal appearance those teeth which, through the ravages of decay and as the result of fracture, have been partially lost.

In reviewing the literature on this subject, it is surprising to note that, until recently, very little information has been available and little change made in materials and technics during the past twenty-five years. This may be accounted for by the lack of interest manifested by the profession. It has, in fact, been stated that less than 5 per cent of dentists today do any porcelain inlay work at all.

Porcelain has certain qualities and characteristics that place it highest among the materials used today in replacing lost tooth structure. Of all the filling materials, it comes nearest to fulfilling all the qualities of an ideal material. This statement is borne out by the readiness with which the dental profession has adopted the substitutes for this material that are brought out by the manufacturers from time to time. So intent are many men today on reproducing the natural appearance of the human tooth, regardless of permanency or the effect on the health of the tooth, that they are virtually digging their professional graves with an agate spatula and a celluloid strip. As a result, countless numbers of good teeth are being lost through the indiscriminate use of cheap and inferior imitations of an ideal filling material. As with all things worth while, there are still certain faithful pioneers who, in the face of adversity and discouragement, caught the vision of the possibilities of baked porcelain and have labored on, striving for the esthetic, the permanent and the ideal. Their courage and devotion have rewarded them with greater achievements. Their names have become immortal in dentistry and mankind has been, and will continue to be, benefited.

The young man of today who strives to emulate the examples of these pioneers by imitating nature and thereby concealing his art will elevate himself to the highest plane of his profession.

The most discriminating patients are today demanding a type of filling that will most nearly simulate the appearance of the natural tooth and, at the same time, preserve the tooth from further danger to its life and from decay.

There is no other material that will more nearly meet the requirements of a perfect filling, especially for the anterior teeth, than baked porcelain. It is, therefore, deserving of recognition in the practice of modern dentistry instead of discouragement at the hands of those opera-

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tors who, through fear of losing a patient or their unwillingness to master a simple technic, advocate an inferior or unsightly material as a substitute. It is true that porcelain work requires a very exacting technic, even more so than gold, for the reason that a porcelain inlay with poor margins and a bad color is much more conspicuous than is the poorly constructed gold filling and so will not be tolerated by the patient.

If every operator would put forth the same effort in porcelain inlay work that he does to master the working of gold, it would soon become as easy to the average operator as the handling of gold. We should train ourselves to think in the most exact terms and, by so doing, develop a technic that will permit of finer results.

The object of the porcelain inlay is to replace the lost tooth structure in such a manner that it will restore to the tooth its natural appearance and function. Porcelain meets the esthetic requirements and thus it remains for the operator to master the technic. In considering the use of porcelain as a filling material, we must first be able to designate the indications and contraindications for its use. In a general way, this may be summed up as follows: All surfaces of decayed teeth that would, on being restored, be exposed to view should be filled with a material which will not be objectionable to the eye, provided the conservation of the teeth would be assured. Following are some of the advantages of porcelain as a filling material: 1. It is much more harmonious to the natural teeth. 2. It is a poor conductor in thermal changes and a nonconductor of electricity; hence, its use lessens the possibility of pulp irritation. 3. The margins of cavities filled with porcelain are not usually attacked by caries. 4. It is comparatively easy of introduction. 5. It is more compatible with the natural teeth than metallic fillings. 6. Its use causes much less strain on the patient than the construction of a foil filling. 7. If a porcelain filling is faulty, this fact is easily detected and the patient knows immediately that the services of a dentist are required. 8. It resists the accumulation of food débris and plaques.

Among the disadvantages of porcelain are the following: 1. It is friable and fractures easily if there is not sufficient bulk to insure strength. 2. The enamel margins cannot be beveled to insure their protection, since porcelain and enamel are of approximately the same strength. 3. Matching of color is many times difficult. 4. The use of cement as a retaining medium may cause change in color of the inlay, especially if the cement is too thick. Certain silicate cements have materially lessened this difficulty.

Proper cavity preparation will also lessen the color problem.

CAVITY PREPARATION

The preparation of cavities that are to receive porcelain inlays differs in two particulars from preparation of cavities that are to receive metallic fillings: (1) the enamel margins are not beveled, and thus greater strength of both porcelain and enamel is maintained, and (2) all cavity margins are prepared as nearly as possible at right angles to the tooth surfaces, the inlay being thereby boxed within the tooth; which makes it an inlay and not an onlay. In preparing cavities on the proximal surfaces of the anterior teeth (and it is in this class of cavities that porcelain inlays are most indicated), it is necessary to have sufficient separation of the teeth not to destroy normal tooth structure, in order to get an impression, or to burnish a matrix and remove it without distortion. This separation is obtained by a slow method, such as pass-

ing a ligature between the teeth, packing a small tightly rolled pledget of cotton between the contact points and bringing the ligature around the cotton packing and tying it in place with a surgeon's knot.

The packing is left in position for about forty-eight hours and, if sufficient space is not obtained, the operation may be repeated. This will usually give sufficient separation without producing undue soreness and will obviate the use of a mechanical separator, which is attended by great discomfort to the patient.

The packing will also force the gum tissue back; which makes the gingival border of the cavity more accessible during preparation. All decay, old fillings and stained tooth structure are then removed by the use of clean, sharp burs and cutting instruments. In the larger proximal cavities, the use of very small finely cut jeweler's files will be found very helpful, producing a well outlined cavity and aiding to establish enamel margins very nearly at right angles to the tooth surface.

Small round burs may be used to correct any margins not properly prepared by the use of the files. Jeweler's files are especially indicated in the preparation of margins of cavities that include the incisal angles of the six anterior teeth since these margins are easily accessible and can be cut square at the incisal margin; which ensures maximum strength to both porcelain and enamel.

In the preparation of all cavities for porcelain inlays, the cavity wall forming the marginal edge should be so cut that it will be presented directly toward the observer, for, in this position, the cement will be the least conspicuous. If this margin is not so placed, a seam of opaque cement will show through either the thin margin of enamel or the thin margin of porcelain and thus the harmony of color will be lost. This is notably true in Class 3, 4 and 5 cavities or those cavities that appear on the proximal surfaces of incisors and cuspids and on the gingival third of labial surfaces of the incisors, cuspids and bicuspids.

In the preparation of Class 3 and 4 cavities, the gingival floor is inclined slightly toward the gingival aspect so as to form an acute angle when meeting the axial floor, and thus extra anchorage is given the inlay to prevent its being dislodged by stresses from the direction of the incisal aspect. The lingual and labial dentin is removed for a short distance under the enamel walls to allow the boxing in of the inlay, this giving added retention and preventing the inlay from being dislodged by stresses from the labial and lingual directions.

In Class 3 cavities, the floor toward the incisal is carried back toward the axial floor in a plane almost parallel to the gingival floor, but slightly converging toward the axial floor.

In Class 4 cavities, the gingival, labial and lingual preparations are the same as in Class 3. At the incisal edge, the dentin is removed from under the incisal portion of the enamel; which allows the floor of the cavity to be set back under the enamel and thus permits boxing the inlay in at this point, which gives it added mechanical retention. Again, I wish to stress the importance of ample separation in Class 3 and 4 cavities in order that unnecessary destruction of good tooth structure may not be suffered in cavity preparation and in making perfect impressions and matrices. We must also remember that these fillings are to be inserted in one piece; which requires more space than does the insertion of a foil filling. When the fillings have been seated and the teeth return to their normal position, the contacts should be sufficiently strong

to offer added retention to the inlay. There are some who advocate the preparation of Class 3 and 4 cavities so as to remove impressions or matrices from either the labial or the lingual aspect. This frequently calls for unnecessary destruction of normal tooth structure, and does not offer any advantage in retention, which is one of the vital points in porcelain work.

Another disadvantage in the preparation of the cavity for removal of the matrix from the labial or lingual aspect, in the direct matrix technic, is that no matter how slight the extension of the apron of the matrix beyond the cavity margin, there is danger of distortion on removal and replacing in the cavity for further burnishing or fitting. No definite rule can be laid down for the removal of the impression or matrix from the cavity other than that it must be removed and replaced without distortion and from the most accessible and convenient point.

Class 5 cavities or those cavities that are located on the labial or buccal surfaces of the teeth are particularly favorable for the use of porcelain inlays. These cavities are exposed to view and so, for esthetic reasons, do not lend themselves to gold restorations. In the preparation, these cavities should be carried to sufficient depth, and extended well into immune areas in order that enough strength may be assured, and also to ensure less change in color; which is greatly influenced by the cement used in retaining them. All margins should be sharp and at right angles to the surface of the enamel. This can be accomplished without danger of fracture to the enamel margins, as would be likely in the foil operation, since there is no malleting or stress on the enamel rods, and when the inlay is seated, the rods are protected.

FRACTURES OF THE ANTERIOR TEETH NOT INVOLVING THE PULPS

The anterior tooth cavity, not involving the pulp and arising from fracture, the result of accident, is often particularly puzzling to the operator, since the thinness of the tooth, and the close proximity to the pulp in this area does not permit of a great amount of retention without encroachment on the pulp. With care, most of these cases may be handled with a great degree of success by the use of the porcelain inlay and are much more pleasing to the patient when baked porcelain rather than gold is used. The general procedure is as follows: All ragged enamel margins are squared, as much of the enamel as possible being saved before any attempt to cut for retention. If the fracture is such that a sufficient amount of the dentin is left, a box preparation is made by the use of sharp fissure burs, cutting between the labial and lingual plates of enamel in line with the long axis of the tooth and extending the box deeper on the mesial and distal surfaces of the dentin than on that portion directly over the pulp. If the fracture is such that this type of preparation would endanger the life of the pulp, two pits may be made, one on either side of the pulp and of sufficient depth to receive either small platinum pins or small porcelain rods, which are baked into the inlay and offer sufficient retention to secure the inlay in position against the normal stresses.

MATRIX

The formation of the platinum foil matrix directly in the tooth cavity is not a difficult operation when one has become familiar with a few simple steps of procedure. The object is to fit the thin foil, one-thousandth or three four-thousandths in thickness, to all parts of the cavity and especially to the fine cavity margins, al-

lowing the foil to extend a short distance onto the enamel surfaces (approximately 1 mm., but, in some instances, more, if it does not interfere with the removal of the matrix from the cavity). This is accomplished by a spinning, burnishing and swaging process. A small piece of platinum is cut, which will cover the cavity and extend a short distance beyond all margins. This is held firmly in place with an instrument or a sharpened orangewood stick to prevent its moving during the process of adaptation. With a small pledget of cotton or spunk, or with an orangewood stick, the foil is gently pressed into place, to roughly outline the cavity margins.

The platinum is then removed and trimmed, all excess foil being cut away and then replaced in the cavity. Holding the matrix, the operator spins the platinum by using a gentle rotary motion, first in the center and gradually working toward the margins, and then brings the labial portion of the platinum neatly over the labial margin, avoiding any folds or wrinkles. With the same procedure, the platinum on all other margins is burnished into place before the final adaptation of the platinum to the cavity walls is attempted. The matrix is then removed and the margins are examined for folds and wrinkles.

The matrix is replaced in the cavity and a small bit of moistened spunk placed in the matrix, and, with burnishers and sharpened orangewood sticks, the platinum is slowly forced into the remote portions of the cavity.

Further adaptation is obtained by placing a small piece of rubber dam over the matrix and the spunk in the matrix and burnishing through the dam. This prevents the matrix rocking while the burnishing process is going on and adapts the platinum neatly and perfectly to all portions of the cavity. It virtually becomes a swaging process directly in the tooth. After formation of the matrix, the dam and spunk are removed and the platinum is gently teased from its seat and carefully removed from the tooth. If this procedure is carefully carried out, there will be only small tears in the platinum which the porcelain will bridge without the danger of passing through and fusing to the opposite side of the matrix. The matrix should always be dry on the first application of porcelain in order to prevent the porcelain from flowing over margins and through small perforations. The formation of the matrix for labial or Class 5 cavities is the same as for other types except that it is not possible to use the rubber dam to hold the platinum in place. This is accomplished by placing the wet spunk in the matrix, which has been given its general form by spinning and burnishing, and by the use of a wood point in an automatic plugger, the spunk being tamped into the matrix, which is firmly held in position by an instrument or orangewood stick, placed firmly on the spunk in some portion of the cavity.

At frequent stages in the formation of the matrix, the platinum should be annealed by bringing it to a white heat, and this is best accomplished in the electric furnace. Each bend of the platinum has a tendency to stiffen the metal and make it tear much more easily than if kept soft by proper annealing. The soft platinum can be worked into deep cavities with very little tearing if this is not done too rapidly. If perforations are made that are too large to permit the porcelain to bridge over, a small piece of platinum may be burnished into the matrix, which will cover these perforations.

The matrix having been completed, colors are now selected to harmonize with the tooth that is to receive the inlay. This should be done only after the

surface of the tooth has been cleaned. If the inlay is of considerable size, as in Class 3 and 4 cavities, the use of two or more shades may prove a great advantage in obtaining a pleasing effect since they will not be so conspicuous as a large inlay of a single color. The porcelain powders, which are placed on a slab separately and mixed with distilled water, are worked thoroughly with an agate spatula to exclude all the air possible and are mixed to a paste of even consistency.

With a small Windsor Newston 00 art brush, a small amount of porcelain is placed in the bottom of a matrix and vibrated. This will cause the porcelain to settle to the floor of the matrix, bridging over any holes which may have been made in the burnishing process, provided the matrix is dry when the porcelain is applied. Care should be used not to allow any of the wet porcelain to flow over the margins of the matrix, as it is impossible to remove this after it has been fired, and each succeeding application has a tendency to flow over the porcelain already fired. The first application of porcelain should not fill the matrix for more than from one fourth to one third of the depth of the matrix.

The porcelain is slightly dried to permit dividing through the center with a fine sharp instrument such as an eye knife or a fine sharpened broach. This allows the porcelain, when baking, to adhere to the platinum matrix instead of shrinking toward the center and distorting the matrix.

The matrix is now placed on the oven shelf on a small slab of fire clay and allowed to dry, and is then placed in the oven and brought to a high biscuit bake. The matrix, with this small amount of baked porcelain, is then returned to the cavity and reburnished by stretching a small bit of rubber dam over the seated matrix and burnishing with a small pointed orangewood stick and burnishing instruments. This will correct any warping or changing of the matrix during firing, and there is little danger of warpage in subsequent baking if care is used in handling and not too much porcelain is applied at each baking. The other layers of porcelain are added, the various colors being placed where desired until the final bake, which is carried to a slightly higher fusing point to assure the inlay a glaze that will represent the natural tooth surface. The margins of the inlay should be finished sharply and just flush with the matrix at all points, so that there will be no necessity of grinding the surfaces of the porcelain after it has been cemented into the cavity. When the inlay has been completed, the matrix is stripped off by grasping the extreme edge of the platinum and rolling it back toward the center of the body of the inlay.

The inlay is now ready to be placed in the cavity to determine whether all margins are correct and is also checked for color. If satisfactory, the inlay should be etched by coating the margins and outer surface of porcelain with wax, and should then be placed in hydrofluoric acid for from two to three minutes; or it should be etched by removing the glaze on the cavity side with a diamond drill or small knife edge mounted stone. If acid is used for etching, all traces of the acid should be removed by placing the inlay in a solution of sodium bicarbonate, which will neutralize the acids, and which is removed by washing with warm water and drying with alcohol. The inlay is now ready to be cemented into place. The cavity is thoroughly dried and wiped out with chloroform. A small amount of cement is mixed to a smooth creamy consistency and placed in the cavity, the operator making sure that all surfaces are covered and all air bubbles removed. The

cement is placed on the inlay and seated in the cavity, being forced gently to place with a silk strip or suitable instrument, and the excess wiped off so that the margins may be examined to determine whether the inlay is properly seated. If slight pressure is exerted on the inlay while the cement is setting, the inlay will be better seated and the cement joint will be stronger and more nearly perfect. The cement, when fully hardened, is carefully removed and the joint is sealed by a thin film of paraffin, or varnish, placed over the inlay and allowed to remain for an hour. This will prevent moisture reaching the cement before it has sufficiently crystallized.

DISCUSSION

Albert L. LeGro, Detroit, Mich.: Like all true exponents of porcelain in dentistry, Dr. Goodman has taken the usual precaution to extol the virtues of the material as applied to dental restorations. Enumerating the many advantages of the use of porcelain seems to be a necessary introduction to every treatise on the subject, and this will undoubtedly be necessary as long as the tendency of the general practitioner continues away from the use of the porcelain inlay to the more difficult porcelain and translucent cements. The words "more difficult" are employed here because the percentage of fillings of these translucent cements that are even fair as compared with a good porcelain inlay is small indeed. A name more suitable for these synthetic translucent cements would be "paradox cements," because they are supposed to be so simple to handle (according to the manufacturers), but are really difficult, and more than ordinary skill is necessary if any degree of success is to be obtained with them. Dr. Goodman's description of a so-called direct technic is timely indeed, but, to my mind, for proximal cavities only. When an operator is so skilful that he makes by the direct method restorations of any kind whatever that constantly win the admiration and commendation of his fellow practitioners, I have no argument to offer; but I believe that, in the hands of the great majority, better dental work can, for them, be produced by that great majority when using the indirect methods, than otherwise. I know, through many years of actual contact with Dr. Goodman in his office and out, that he obtains most satisfactory results with the direct method, especially for proximal cavities in anterior teeth. To conserve as much tooth substance as he does necessitates use of the direct technic. In fact, in these cases, it is impossible to employ the indirect methods. His technic is simple and, as I have intimated, absolutely necessary. It is hoped that Dr. Goodman and some of his confrères may succeed in bringing about a Renaissance in this particular branch of the porcelain art; for, aside from its employment by a very few, it has lain dormant for some time. This paper will, I hope, be the vehicle that will bring many a former as well as a prospective porcelain enthusiast, into the fold. One important phase of the inlay technic, especially the cementing of porcelain inlays in simple cervical and buccal cavities, is the use of cements. It is, of course, advised that this form of cavity be made as deep as possible and that the wall of the cavity be at right angles to the surface of the segment of the circle that it immediately approaches. A snug filling, even in such a cavity, may become dislodged, often to the dismay of the operator. This is caused, if the inlay fits properly, by the washing out of cement (more often not) or by traumatic blows on the cusp of the tooth, the shock of which, on its way to the axis of the tooth, passes through all or a small part of the filling. This may be the result of one shock, but, more logically, it is the result of a series of consecutive shocks from a single point and in a single direction. The shock of kicking the toe of a boot to remove the mud from the heel is something similar. I feel, therefore, that this particular kind of inlay should be grooved around its entire periphery and that a similar groove should be ground in the cavity to approximate it. This accomplishes two things, insuring that

the filling will remain there in spite of blows and, equally important, permitting the use of translucent cement, which is necessary for shade and does not absorb the light rays as does oxyphosphate cement, thus insuring the original color of porcelain in the cemented filling. In all buccal and cervical porcelain inlays, the bite should be checked often to determine whether the natural wear of the teeth is allowing unusual shocks. If these are corrected, at least once each year and the other precautions mentioned are taken, there should be no fear of dislodgment of this type of filling.

FUNCTIONAL SPACE MAINTENANCE: HAS IT A PLACE IN DENTISTRY FOR CHILDREN?*

By C. S. FOSTER, D.D.S., Cedar Rapids, Iowa

SINCE the publication of Dr. Willett's first articles, in 1928, suggesting the possibilities within the hands of the dental profession to prevent or intercept developing malocclusion, many interesting discussions have taken place. It seems advisable at this time that a plea be made in defense of what, to my mind, is one of the most valuable contributions given to the profession in recent years. If through some stroke of magic, one tenth of the cases of malocclusion caused by premature loss of deciduous teeth that are seen in every dental office,

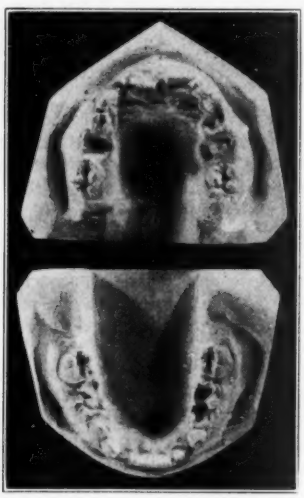

Fig. 1.—Casts in case of boy, 7 years of age, showing all eight deciduous molars so badly decayed that extraction was necessary to eliminate mouth infection.

Fig. 2.—Casts in case of girl, aged 7, showing crippled occlusion following extraction of six deciduous molars.

*Read before the Section on Orthodontia at the Seventy-Seventh Annual Session of the American Dental Association, New Orleans, La., Nov. 6, 1935.

dental school and children's clinic throughout the country could be brought before us, the need for a more general application of the fundamental principles of preventive orthodontia, through use of functional space maintainers, proper dental restoration, etc., would be so

Fig. 3.—Condition of mouth of girl, aged 6, following extraction of all ten upper deciduous teeth, and three lower deciduous molars.

Fig. 4.—Casts in case of girl aged 7½, showing typical collapse of lower arch following extraction of lower left first deciduous molar when patient was 6½ years old.

clearly established that even the most skeptical would be convinced.

Functional space maintenance is but one link in the chain of prevention as applied to malocclusion, but so important is this link that it behooves us, more closely associated with orthodontic problems as related to treatment, continually to stress its possibilities. The responsibility for the prevention of malocclusion lies squarely with the family dentist. He should rec-

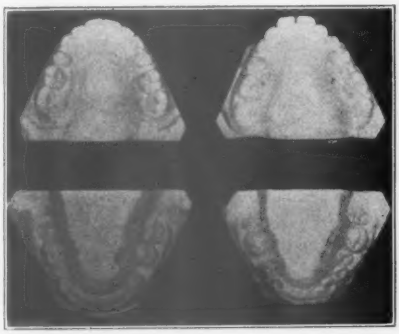

Fig. 5.—Casts of two cases showing three impacted bicuspids.

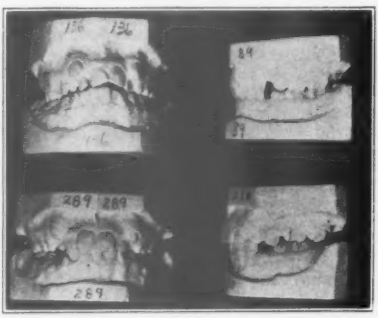

Fig. 6.—Above, right: Casts showing results of premature loss of upper left deciduous cuspid and first molar, and lower left deciduous cuspid. Below, right: Forward drift of upper left first permanent molar following premature loss of upper second deciduous molar. Upper and lower left: Malocclusion associated with multiple loss of deciduous teeth.

ognize the detrimental influence of the premature loss of deciduous teeth on the normal development of the jaws and face,

Fig. 7.—Lack of development associated with multiple loss of deciduous teeth.

Fig. 8.—Casts in case of girl, aged 9, showing malocclusion complicated by premature loss of seven deciduous molars at an earlier age.

Fig. 9.—Casts in case of boy, aged 13, in which history reveals loss of several deciduous molars the first year of school.

and he should make use of every available means to eliminate it as a direct or contributing cause of malocclusion.

In an article published in THE JOURNAL in 1933, F. Blaine Rhobotham said[1]:

1. Rhobotham, F. B.: Children's Dentistry in Relation to Orthodontia, J.A.D.A., 20:865 (May) 1933.

Fig. 10.—Patient in case shown in Figure 9. Figures 11-25 present a few cases in which the premature loss of deciduous teeth has been or is being controlled through the application of functional space maintainers.

Fig. 11.—Application of simple space maintainer following loss of lower left first deciduous molar in a boy aged 7.

Fig. 12.—Occlusion as restored by functional space maintainer.

Fig. 13.—Space maintainers placed after loss of both lower first deciduous molars at age 6.

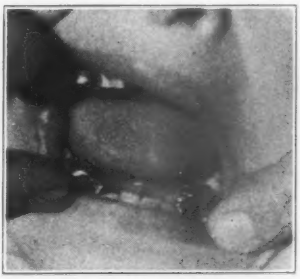

Fig. 14.—Boy, aged 6, in whom space maintainers were used to replace two lower first deciduous molars and upper right first deciduous molar.

Fig. 15.—Case shown in Figure 14; function as restored by opposing space maintainers.

Some conception of the preventive field in orthodontia is had from the research of O. W. Brandhorst of St. Louis. In a study of 100 cases, he reports that the frequency of occurrence of various etiologic factors of dentofacial deformities is controllable in 81 per cent of cases, while only 19 per cent fell under the heading of questionable. The 81 per cent, he classifies as follows:

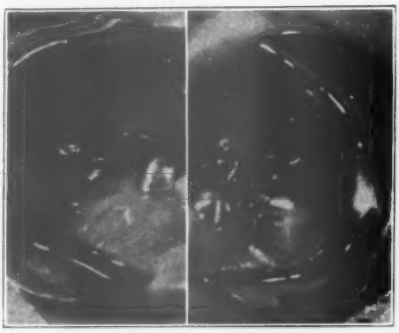

Fig. 16.—Case in which four space maintainers were used; in a patient aged 7.

Fig. 17.—Supplying lower left deciduous cuspid; in girl aged 7½ years.

Fig. 18.—Case shown in Figure 17; four years later, after normal eruption of permanent cuspid.

Premature loss of deciduous teeth, 37 per cent; prolonged retention of deciduous teeth, 19 per cent; habits, 25 per cent.

Frank A. Delabarre, of Boston, says[2]:

In a manufacturing town of 25,000 in

2. Delabarre, F. A.: Preschool Age Dentistry, J.A.D.A., 20:124 (Jan.) 1933.

Fig. 19.—Space maintainers of bar type for three lower deciduous molars; in girl, aged 7.

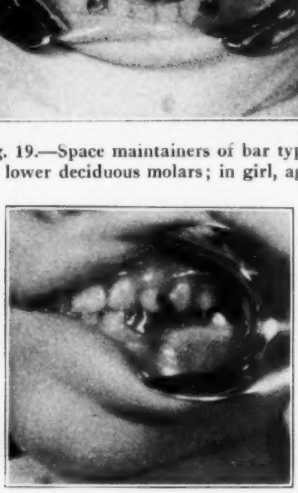

Fig. 20.—Case shown in Figure 19; erupting upper left bicuspids held in line of occlusion by lower bar.

Fig. 21.—Patient in case referred to in Figures 19-20; aged 11; showing eruption of permanent lower cuspids and bicuspids without difficulty; left side as teeth are settling into occlusion.

Massachusetts, 261 children all under 6 years of age, about to enter school, were examined and found to average eight and nine-tenths open cavities and one abscess each. One child had thirty-three cavities and one child seven abscesses.

In the children's clinic of the College

Fig. 22.—Case shown in Figure 3; casts in case of 6-year-old girl.

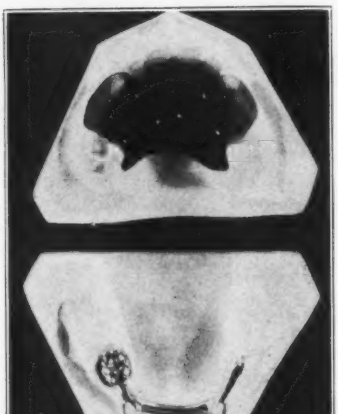

Fig. 23.—Functional space maintaining appliances used for 6-year-old girl (casts of case shown in Figure 22).

of Dentistry, University of Iowa, Drs. Drain and Cheyne tabulated the following: Of 396 patients in the 4-year-old group, forty-five, or 11 per cent, had extractions. For these forty-five 4-year-old children, eighty-one teeth were extracted, of which fifty-seven, or 70 per cent, were deciduous molars. Of these fifty-seven molars, twenty, or 35 per cent, were lower second deciduous molars.

Of 693 patients in the 5-year group, 139, or 20 per cent, had extractions. For these 139 5-year-old patients, 292 teeth

Fig. 24.—Casts made sixteen days before patient's eighth birthday. The first permanent molars and upper central incisors are erupting. Further forward drift of the first permanent molars has been controlled.

were extracted, of which 241, or 85 per cent, were deciduous molars. Of these 241 deciduous molars, sixty-four, or 26 per cent, were lower second deciduous molars.

Of 878 patients in the 6-year group, 268, or 30 per cent, had extractions. For the 268 6-year-old children, 592 teeth were extracted, of which 454, or 76 per cent, were deciduous molars. Of these 454 deciduous molars, 181, or 39 per cent, were lower second deciduous molars.

In the 7-year-old group, 1,058 patients were examined, of which 368, or 34 per cent, had extractions. For these 368 7-year-old patients, 816 teeth were extracted, of which 512, or 62 per cent, were deciduous molars. Of these 512 deciduous molars, 181, or 34 per cent, were lower second deciduous molars.

In a survey of over 5,000 children of school age, Don C. Lyons, of Jackson, Mich., found that[3]: "In children between the ages of 5 and 12, where malocclusion was noted, 65 per cent was associated

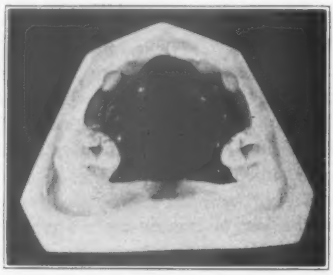

Fig. 25.—Change made in upper appliance.

with early or premature extraction of deciduous teeth with no attempt made to retain the space." Further evidence of the loss of deciduous teeth at an early age and cases of malocclusion in which premature loss of deciduous teeth was an established etiologic factor will be shown by illustrations of a few of many such cases encountered in my practice.

In a limited presentation such as this, it is possible to present only a few statistics and illustrations, and I am aware that they may not be accepted as con-

3. Lyons, D. C.: Importance of Early Recognition of Dental Disorders in Children, D. Cosmos, 66:535 (May) 1924.

clusive proof of the theories advanced, but they should be sufficient to show that premature loss of deciduous teeth is an etiologic factor in many cases of malocclusion. What then is to be gained by continuing to argue the point? The fact that the premature loss of a deciduous tooth under the most favorable conditions, did not, in certain cases, result in malocclusion is no argument. Why not accept the challenge then and unite in our efforts to solve the problem?

The fundamental principles of prevention through the use of functional space maintainers, the technic of their construction and the theory of their application have been so thoroughly covered in articles published by Willett and others that a detailed discussion of these is unnecessary.

It does seem advisable to review the requirements of an adequate space-maintaining appliance. Merely to provide for the retention of space in an affected area is not sufficient. A proper appliance should: (1) maintain the space resulting from the loss of one or more teeth; (2) restore the function of occlusion to the affected area; (3) prevent elongation of opposing teeth; (4) allow, when possible, individual movement of anchor teeth, and (5) provide attachments to anchor teeth of such type as to give ample stability to the appliance. Orthodontic bands do not meet this requirement.

It is my belief that the apparent indifference of so many dentists toward this important phase of dentistry for children is due, not to the lack of supporting evidence, but rather to the failure of dentists to make note of the evidence available. If the heads of the children's departments of every dental school, the directors of the numerous children's clinics and school dentists alone would systematically record and publish the statistics showing the frequency of the premature loss of deciduous teeth with its involvement as an etiologic factor in malocclusion, functional space maintenance would receive its proper place in the field of prevention, and dentistry for children would approach one step nearer the ideal of the future:

"To cure is the voice of the past; to prevent is the divine whisper of the future."

803 Dows Building.

WHAT THE PHYSICIAN SHOULD KNOW ABOUT DENTISTRY*

By EDGAR V. ALLEN, M.D., and BOYD S. GARDNER, D.D.S., Rochester, Minn.

IT is unusual that a physician and a dentist should collaborate in an effort to show physicians and dentists the need for close cooperation, but there should be nothing remarkable about the situation noted. The physician and surgeon commonly collaborate in the conquest of illness; the ophthalmologist frequently turns to the urologist for help, and the internist routinely utilizes the expert knowledge of the roentgenologist and chemist. One would truly be living in the "horse and buggy age," if he addressed a group of physicians on the need for collaboration of internist and bacteriologist. Such collaboration is an established fact and needs no comment, although the need of cooperation is recognized by dentists almost unanimously, and by physicians endowed with vision. Many things point to the fact that the cooperation mentioned is not a fact. An infallible sign of failure is the constantly recurring statement by many dentists and few physicians that unity of effort is required. When these statements cease, the goal will have been accomplished. Until this time, these "voices crying in the wilderness" must continue until their vehemence breaks through the indifference that cloaks the consciousness of most physicians. To be sure, the dentist is an integral part of such medical groups as those of Columbia University, Presbyterian Hospital, New York Hospital, Cornell Medical Center, Tulane Medical Center, Army Medical Center, Yale University and The Mayo Clinic, but these groups care for only a small portion of those who are ill. Equal cooperation should exist in every locality where there are a physician and a dentist.

At many meetings of dentists, physicians speak on medical conditions that dentists should recognize, but meetings of physicians that are addressed by dentists must be comparatively rare. Is this due to a lack of desire on the part of physicians to learn, or does it arise from a feeling of inferiority on the part of dentists? Whatever the answer, and there may be two answers, physicians need to know more about dentistry.

We do not wish to point the direction in which the fault lies, but as a physician and a dentist with a common aim, namely, the care of those who are ill and the prevention of disease, we wish to add our communal voices to the chorus that has been sung too frequently in half-hearted volume to many who have had no appreciation of the music. Our aim is, therefore, an educational one.

Physicians are inclined to consider dentistry a laggard science and art, but this is not true in America, as we will emphasize later. Physicians may be interested to know that the first college of dentistry

*From the Division of Medicine and Section on Dental Surgery, The Mayo Clinic.

*Read before the Section on Oral Surgery, Exodontia and Anesthesia at the Seventy-Seventh Annual Session of the American Dental Association, New Orleans, La., Nov. 6, 1935.

in the world was at Baltimore and that a dentist first demonstrated nitrous oxide anesthesia. It is interesting to note that, in America, the dental profession was the first to attract the European for finishing courses, just as Europe was drawing men for advanced study in medicine and other professions.

We believe that our experience at The Mayo Clinic is an object lesson in dental and medical cooperation. Dental diagnosis is as much a part of our service to patients as is diagnosis in the practice of dermatology, roentgenology, ophthalmology and other specialties. The dental section is managed by three dentists as other sections are managed by three or four physicians. These doctors of dentistry attend medical conferences and meetings, address physicians on subjects of interest and contribute to the unity of purpose as do doctors of medicine. Our weekly staff meetings and conferences are open to visiting physicians and dentists alike. Dentists are privileged to attend surgical clinics. The Mayo Foundation, an integral part of the University of Minnesota, furnishes fellowships in dentistry as well as in surgery, medicine, proctology and other specialties. The privileges of all fellows of the Mayo Foundation are identical.

The practical value of the dental department is apparent daily. A high percentage of the patients at the clinic have their teeth examined roentgenologically and, in each instance, a consulting dentist studies the roentgenograms and reports his findings and recommendations to the diagnostician. That this service of dentists to physicians is one of major importance is the firm conviction of all physicians on the staff of The Mayo Clinic. In fact, the acceptance of this service is universal and unanimous in our own group and therefore occasions no comment. We wish to emphasize that dental examinations are not reserved for patients with dental symptoms, but, in many cases in which the teeth and integuments are apparently sound, dental examination is carried out as routinely as the blood and urine are examined. In a recent case of dental caries, the dentist requested investigation of the patient's diet. It was found that milk, cheese, orange and tomato juices had been excluded from the diet because of supposed intolerance of these foods by the patient. Thus, the alert dentist not only served the patient well, but also convinced the physician that the dentist may be as accurate and logical as the physician.

In the course of this presentation, much will be said that is familiar to many dentists. This is because the paper was prepared for presentation to physicians chiefly. However, many dentists will be surprised at how little they know of their own profession, and we feel that the facts presented may do much to instil dentists with pride for the accomplishments of dentistry.

RESEARCH IN DENTISTRY

In the past twenty years, research in dentistry, which has become intensive and cooperative, has embraced fields of chemistry, nutrition, bacteriology, metabolism and biology. The methods of approach by excellent workers and the results of investigation compare favorably with superior efforts in fields of medicine. As a result of these inquiries, dentistry is viewed by many today as that branch of the healing science which has made the greatest advance in two decades. Dentistry is no longer considered a mechanical art. Teeth have surpassed the rank and standing of mechanical appliances serving the dual purpose of mastication and adornment. It is now known that teeth, like bones, are dependent, as far as architecture is concerned, on min-

erals and vitamins, as well as extraneous elements. The need for research in dentistry was recognized as early as 1910 by the American Dental Association, and in 1912, the Trustees appointed a committee to form a research department to stimulate, establish, support and encourage the spirit of research among undergraduates, practitioners and universities. At that early date, financial aid was extended to various workers on such problems as mottled enamel, salivary calculus, etiology of erosion, the peridental membrane, caries, relation of glands of internal secretion to dental problems and salivary deposits. By July, 1914, various members of the dental profession had pledged almost $40,000 for aid in research. Since 1922, the American Dental Association has appropriated, roughly, $235,000 for dental research, which is approximately 10 per cent of all expenditures by this organization. Does one need further evidence of the intense desire of dentists to solve dental problems?

In 1926, the Carnegie Foundation for the Advancement of Teaching said in its bulletin, "The Commission, all of whose twenty-five members serve without remuneration and are plainly animated by the most commendable motives, has done more than any other agency to arouse interest in research among dental practitioners and continues to quicken the spirit of inquiry in the American Dental Association." In 1928, arrangements were made with the Bureau of Standards to work on a cooperative basis and the Weinstein Laboratories Research Fellowship was formed. Each year since that time, the federal government and the American Dental Association has appropriated between $5,000 and $10,000 each for certain types of research and standardization of materials commonly used by dentists. As a result of the activities of the Weinstein Laboratories Research Fellowship in standardizing products, thousands of dollars have been saved patients, who prior to this time were served with faulty products of which individual dentists could not determine the value. It is obvious that expert workmanship is unavailing if defective materials are used. Dentists prove themselves only human when they fail to take advantage of the remarkable progress made, but even the human frailty of indifference must give way before continued effort. In 1933, dentistry as a profession was given a place on the program of the American Association for Advancement of Science, along with 137 other societies representing mathematics, physics, chemistry, zoology, botany, sociology, astronomy, engineering and medicine. Is any other evidence needed that dentistry has advanced from the groping and helpless stage of infancy through adolescence into full maturity?

The procession of research is well under way. In February, 1930, there was initiated at Columbia University an extensive project for the investigation of the causes of dental caries, a project made possible by financial assistance of the Commonwealth Fund of New York. A special committee directed histopathologic studies of dentin and enamel, a comparative study of the chemistry of saliva, blood and teeth, a study of bacteria and of nutrition and a study of the experimental production of dental caries. Last year, James B. Conant, president of Harvard University, appointed a committee on Research in Dental Medicine, the aim of which is the promotion of dental research and establishment of contacts for the dental school with other departments of education and investigation. Eight thousand dollars was allotted for these purposes in 1934-1935. The committee is composed not of dentists alone but of professors of physiology, chemistry and

pathologic anatomy, as well. At the present time at Yale University, there are no less than eight pieces of research being carried out on different phases of dental caries.

We do not have the information to list all research activities in the dental profession and we have no desire to do so. There are doubtless many that are as great in magnitude and scope as those that have been mentioned. We do wish to stress the fact that research in dentistry is alive, active and progressive in ways that can but awe the uninformed and awaken pride among members of the dental profession.

IMPORTANCE OF DENTISTRY TO MEDICINE

Focal infection has been established as an important factor in the etiology of disease. So much evidence to this effect has accumulated in recent years that progressive physicians in this country are well aware of the situation. There are several foci of infection, among these being the tonsils, the accessory nasal sinuses, the prostate gland, the uterine cervix, the pharynx, the teeth and periodontal structures, and, more rarely, the gallbladder and appendix. The situation as far as teeth are concerned is perfectly clear in one regard: periapical infections may contribute substantially to the origin and course of numerous diseases. Other dental conditions are likewise important in this regard, though the fact is little recognized. Every pulpless tooth is potentially a focus of infection, as can be demonstrated bacteriologically, although one cannot determine by detailed roentgenologic and other examinations whether a devitalized tooth is a source of infection. The absence of teeth does not exclude dental infection. In fact, in more than 30 per cent of instances in which all teeth have been extracted, roentgenologic examination will disclose retained roots. These roots usually are infected. The periodontal tissues in cases of pyorrhea contain many bacteria, and this condition must be corrected because these organisms or their toxins may be disseminated throughout the body. Finally, unerupted or impacted teeth may be sources of infection, and when foci of infection contribute to disease, such teeth should be removed.

It is apparent that casual inspection of the teeth to determine sources of dental infection is as valueless as casual inspection of the thorax to determine heart disease. Physicians generally must awake to the fact that only the trained dentist who is an expert in dental roentgenology and examination can give a valuable opinion regarding the teeth and contiguous structures when foci of infection are sought.

The alert physician will ask at once if all the dental conditions mentioned should be corrected in face of the fact that the general condition of the patient is excellent. Unfortunately, we cannot give an unequivocal answer. Many persons are able to withstand infections of a dental nature for many years, or permanently, as a result of a high degree of resistance. For years, the controversy has continued relative to the need of tonsillectomy when tonsils appear to be infected. The conservative attitude of many otolaryngologists is that tonsils which apparently are infected should be removed only when disease associated in some way with foci of infection is present, or when recurrent tonsillitis or gross disease or marked enlargement of the tonsils is present. Obviously, there can be no single comprehensive answer to the question of "silent" dental infection. Certain it is that many persons attain healthy old age with obvious tonsillar and dental infection. They may be survivors by virtue of a peculiar fitness, while less fortunate persons may succumb. The living may be less of an ex-

ample than the dead of the importance of "silent" dental infection. A conservative attitude as far as these infections are concerned is that sources of infection should be eliminated, if such is possible without destroying the function, beauty or comfort of normal teeth.

Finally, the fact that imperfectly alined, discolored or carious teeth may be responsible for unhappiness and a feeling of inferiority in persons who are otherwise normal should not be regarded lightly. That this awareness of the appearance of teeth has been brought about by advertisers of dentifrices with whom we have no sympathy is beside the point. The appearance of the teeth is as important as the possessor regards it, and like unshapely limbs, acne, unsightly noses and deafness, ugly teeth may upset the equanimity of sensitive persons and cause them to shrink from social contacts. These conditions may indeed lead to profound psychic disturbances the origin of which is so deeply buried in the subconscious and the past that even the afflicted one may be unaware of a cause and effect relationship.

A word of warning should be offered about the failure of eradication of dental infections to check certain diseases. It has been assumed by many physicians that because removal of infected teeth has improved the arthritic condition in certain cases, the procedure should produce the same results in all cases of arthritis. Such is far from true. Gout, which is the result of disturbances of metabolism; senescent arthritis, which is the result of imponderables of the process of aging, and traumatic arthritis, which is the result of excessive strains, will not be benefited specifically by the removal of infected teeth or other foci of infection. The arthritic patient who has so-called infectious arthritis that has progressed to deformity and contracture will not be restored to normal. Parenthetically, we may remark that the physician is negligent in his duty if he allows arthritis of the infectious type to progress to the stage of deformity while dental infection persists.

THE RESPONSIBILITY OF THE PHYSICIAN TO THE DENTIST

It is well known that members of the medical profession in general are very indifferent to dental problems. The attitude is that the maintenance of normal teeth and correction of dental disease is the dentist's problem and he is responsible for the solution of it. This is far from true. The medical profession is responsible for a large share of dental disease. A great many dental conditions start before birth or in early childhood, when mothers and children are entirely under medical supervision. It is unfortunate that few physicians recognize the relationship between nutrition and sound teeth and that so few are qualified, or interested enough, to prevent avoidable dental disease or to cooperate with the dentist in staying the ravages of it.

We need give but one observation as related to dental caries to stress the importance of the rôle of the physician in combating this condition. The Columbia University Dental Caries Research Group, after four years of study, reported in February, 1934, that "the process of dental decay is associated both with environmental factors related to food retention and lactobacillus fermentation and with physiologic factors related to calcium-phosphorus metabolism." Since calcium and phosphorus metabolism is well within the realm of medical activities, the responsibility for this phase of dental caries must be accepted by physicians. Every physician should know that when caries exists, the patient's diet should be reenforced with a pint to a quart of milk, one egg, one or more tomatoes, or or-

anges, an ounce of butter, two or more helpings of succulent vegetables and of fruits, and cod liver oil. Milk supplies the calcium; fruits contain vitamins B and C; butter in summer time and cod liver oil at all times contain vitamins A and D, the latter of which is important for the utilization of calcium. When milk is secured with difficulty, or when patients are allergic to it, some of the calcium salts, such as dibasic calcium phosphate, can be used. Viosterol or haliver oil can be substituted for cod liver oil. The average physician may ask a patient two or three questions about his diet and decide it is adequate, but careful inquiry may indicate woful deficiencies. Whenever caries exists, careful investigation of the diet is advisable.

Just as the dentist is trained to observe conditions in the mouth that are significant from a medical standpoint, so the physician must be trained to note dental conditions, such as caries, periodontoclasia, malocclusion, poor hygiene, fistulas, infections of the Vincent type and the presence of an insufficient number of teeth for proper mastication.

The medical profession has a vast responsibility in dental disease of adults because it has frequently begun in intrauterine life, or in infancy or childhood, when the little patients were solely under the care of a physician as far as health is concerned. Unfortunately, parents still believe that dental care is necessary only for permanent, fully developed teeth. As long as this situation exists, the responsibility for sound teeth belongs, in a large degree, to the physician. The tooth replaced by a bridge at the age of 30 years was a pulpless tooth at 20 years. The pulpless tooth at 20 years was a decayed tooth at 10 years. The decayed molar at 10 years erupted into the mouth at 6 years of age but was being formed at birth. At the moment of birth, several years before the mother takes her child to the dentist, the chewing surfaces of the permanent molars are forming. The materials needed for building sound teeth before the birth of the child must be present in the mother's blood in sufficient quantity and suitable form. At the age of 4 or 5 years, parts of the permanent teeth are as large as they will be in adult life. Permanent loss of temporary teeth may cause irregularity of the permanent teeth unless a mechanism of some sort is introduced to maintain the space. These observations indicate the crying need of more dental care for children. Childhood habits of thumb sucking, lip biting, lip interposition and mouth breathing may cause marked distortion of perfect dental arches. In many instances, the physician is responsible for an avoidable situation. Too frequently, he believes that the condition of temporary teeth is insignificant. He is unaware of the influence of poor temporary teeth, and the conditions that make them poor, on permanent teeth. He does not understand the necessity for correcting these habits of childhood.

The solution of the problem lies in educating physicians and interesting them in dental problems. We recommend that the Board of Trustees of the American Dental Association outline a threefold program of education and endeavor. First, some part of the curriculum of medical students should be given over to dentists to educate medical students in dental problems and dental care. The importance of the condition of temporary, unerupted and young permanent teeth should be stressed. Dietary control of dental caries and other dental conditions should be emphasized. A physician should discuss mineral metabolism in relation to dental conditions and put the responsibility of much future dental disease squarely on the shoulders of these future physicians. Secondly, physicians in-

terested in dental problems should be encouraged and helped to educate and inform themselves regarding the medical aspect of dental disease so that they may educate their colleagues through the medium of medical papers and talks before groups of physicians. Thirdly, physicians who have a research type of mind, and who so desire, should be encouraged to investigate thoroughly the problems of nutrition and metabolism that are related to dental disease. There may be some disagreement about the field into which the last mentioned subject falls, because dentists have been driven largely by necessity to supervise it themselves. In all honesty, we must say they have done an excellent job. We raise the question as to whether the road of progress would not be easier if there were free medicodental cooperation in this direction.

As dentist and physician, we believe that the program is a possibility. We are aware that physicians have not been quick to accept valuable information that is the property of dentists. Is this not a problem of education? We believe it is. We are aware that dentists have too frequently been rebuffed by physicians. Is this not a problem of method of presentation? We believe it is. We are aware that dentists are too frequently viewed by physicians as mechanics who repair defective parts solely. But is this not an attitude that originates in ignorance? We believe it is. Members of all professions of first rank who care for those who are ill are equipped by training and education to work cooperatively to a common end; namely, the conquest of disease. It would be a sad reflection on the dental and medical professions if a universal cooperative and communal interest could not be developed. As dentist and physician, we believe it could be.

DENTISTRY AND ORTHODONTIA*

By JOHN E. GURLEY, D.D.S., F.A.C.D., San Francisco, Calif.

LIFE is said to be "the continuous adjustment of internal to external conditions." Just what Herbert Spencer may have had in mind in the use of the term "life" may not now be easily determined. But, in all probability, there would not be lengthy debate as to the truth of this statement regarding the physical life of any living organism. There are definitely internal and external relations needing adjustment. You will agree that "life" rather than being a real entity in itself consists of several phases, one of which is the mental phase, or the mind. And there are many instances of the need of adjustment between internal and external conditions of the mind. Just an ordinary lesson to be learned, or the adjustment of a dispute between any two, should be sufficient illustration.

These conflicting relations or reactions that may strike on the mind have to do ultimately with its growth or development, and may constitute, in part at least, learning, or training, or education.

As a fundamental or underlying

*Read before the Section on Orthodontia at the Seventy-Seventh Annual Session of the American Dental Association, New Orleans, La., Nov. 6, 1935.

thought for consideration, John Stuart Mill has very ably defined education as "the culture which each generation purposely gives to those who are to be its successors, in order to qualify them for at least keeping up, and, if possible, for raising the level of improvement which has been attained."[1] With a liberal interpretation of the word "culture," this definition meets our requirement. It is easily demonstrable that dentistry, with its specialty orthodontia, has, through the generations past, raised its "level," and is even now in better position for future generations to raise that "level" to a still higher plane of usefulness, both to practitioner and to patient. In the further consideration of this thought, the following outline is suggested:

Dentistry—past, present and future.

The development of orthodontia.

The patient—his dental and orthodontic requirements.

How shall these requirements be met?

Simple and complex cases—where is the borderline in practice?

Training for the specialty of orthodontia.

The true profession.

DAY AFTER TOMORROW IN DENTISTRY

I graduated from a little country high school, up in the wilds of Northern California, in 1901. It was the desire of my mother that I take up the study of pharmacy. Without thought of my own, and following her suggestion, I called on the druggist in a nearby town and arranged to go into his store as an apprentice. All details were settled, when the druggist said, "Why don't you take up dentistry? It isn't much now, merely a mechanical sort of work, but in ten years from now, when you will be ready, it will be a real profession."

I went home to think it over and talk with the family. As a result, I decided on dentistry as my life's work.

This was in 1901. In 1912, or thereabouts, the so-called focal infection theory was presented to the health professions. Along with this came the use of the roentgen rays, and the complete revolutionizing of dentistry. It is true that dentistry had been in part revolutionized by the work of the late G. V. Black, and that at the time of the introduction of the focal infection theory, operative dentistry had been quite well developed, but even this may be considered as well within the domain of mechanics or technics. It took the focal infection theory, and its concomitants, to force us to think in terms of science.

The period immediately following saw an intense development along technical lines, though in an effort to follow rational or scientific, rather than empiric lines.

About 1900, the college course was extended from two to three years. This continued until about 1918, when it was extended to four years. Later, it was made a five year course, with optional six year courses. Why?

During these early years, our minds were centered on mechanical prowess. It was a common boast that given a root with a modicum of stability, we could make a tooth out of it. All of this had to go by the board, for, in these later years, research was begun within the ranks of the profession, and we were changed from a mechanical to a scientific body of workers.

This, too, was the era of so-called industrial development. Men became proficient in all lines, so that today there is scarcely anything of which you may think that some one cannot make for you. The other day a man said, "All we have to do is to determine what we want, then we

1. Horne, H. H.: Idealism and Education, New York: The Macmillan Co., 1916, p. 63.

can find the man or men who can do it." And this is nearly true.

But this industrial period, through which we have just passed, has been hard on us. Men became so proficient: there was so much that a man could do, that he developed independence to the point that he depended on no other.

This probably was due to the fact that all he had learned to do was upon the inanimate. Although both medicine and dentistry may have been serving human beings, yet the particular entities with which physicians and dentists were working belonged to the inanimate world—they were the developments of the inanimate sciences, chemistry and physics, and we learned to think in terms of the inanimate.

This is not altogether to be condemned, for we did serve the people in a way far superior to that of the past, and the improvements are now, and will always be, extremely essential.

Progress, growth, development or whatever you may prefer to call it forges quietly ahead, nor does it follow altogether a single course. For during this time, too, men were developing along another line. In the early days, when population was sparse, there were no telephones, no telegraph and no fast transportation. Our social, economic and political lives were of no great concern. But these inanimate sciences had changed, or were changing, all these relationships, so that it became necessary for some study to be made of our social relationships; hence, the so-called life sciences were born into the world of things, and men began to think more in terms of the animate. These life sciences are two in number, biology, which teaches man how to live, and sociology, which teaches men how to live together. These, of course, include their subdivisions, bio-chemistry, economics, political science, and all the rest.

As a result of our thinking along these lines, we have found changes within our profession. We find a better understanding and a fuller appreciation of our ethical relationships, both with our patients, and among ourselves. We find ourselves spurred on to higher proficiency in our technical procedures. We find ourselves thinking definitely in terms of prevention, and the care of children. We find ourselves desirous of, demanding and rapidly acquiring independence from those practices and commercial relationships that have so thoroughly dominated us in the past. We may point with pride to our first steps in this direction, by calling to mind the work of the Research Commission and of the Council on Dental Therapeutics of the A.D.A.

There has just been submitted to the American Association of Dental Schools, the report of the Curriculum Survey Committee. This should be studied diligently by every practicing dentist. Dr. Hapgood, of Harvard University, writing on the "Background of Pre-Dental Education,"[2] says, "The qualities necessary for professional success may be grouped in four main divisions: 1. Character and Integrity. 2. Erudition and Intelligence. 3. Personality. 4. Technical Skill and Ability." I have seen this thought paralleled in a survey of educational requirements for engineers, in their efforts to raise their status to that of a profession. The business of our schools just now is to accomplish this task, and we will see that advance in the next generation of dental practitioners.

During all the years of the past, our literature has been provided by dental manufacturers and supply houses. The time has come when we, demanding our independence in so many different ways, demand the publication of our own lit-

2. Harvard D. Rec., April, 1935, p. 10.

erature. This must be so, in order that it shall be permeated with the spirit of professionalism, rather than commercialism. We are not ungrateful to those of the past, nor are we biting the "hand that fed us," but, with due appreciation of the efforts of those who have brought us to this point, like the child now grown to manhood, we want to, and must, use our own initiative. THE JOURNAL OF THE A.D.A. has led along for many years. The *Journal of Dental Research* is owned by dentists, and we now have the *Journal of the American College of Dentists,* and many state journals that are a credit to their owners and publishers. Some states have joined together in publishing a regional journal. This is economically proper, and in the future we will see more of this.

These "Day After Tomorrows" consist of service development, professional development, educational development, cultural development, social development, and physical development. And it is well. Altogether, they spell better health. This is as it should be.

If we would that man should have better health, there are two or three questions that we should answer. What is health? What is man? What is life? Either one of these is a subject for many discussions, but to answer all briefly, suppose we consider the following:

Health is that condition in which one lives most and serves best.

Lotze says, "To be (existence or life) is to be in relations."

I like to think of man as one who is physically fit, mentally trained, socially acceptable, even desirable, and whose spirit is in tune with the Infinite.

"Bad will be the day for every man when he becomes absolutely contented with the thoughts that he is thinking, with the deeds that he is doing, when there is not forever beating at the doors of his soul some great desire to do something larger, which he knows that he was meant and made to do, because he is still, in spite of all, the Child of God." (Phillips Brooks.)

THE DEVELOPMENT OF ORTHODONTIA

About 1908, orthodontia began to take on the appearance of a specialty. Prior to that, even for years before, much good service had been rendered by way of straightening the teeth, but it has been since then that we have seen that practice develop. There was at that time, followed a little later by only a few others, one private school for the teaching of orthodontia. There were no associations of orthodontists, but today orthodontic associations are in existence as the American, sectional, state and district, and orthodontia always constitutes a part or section of a dental meeting, state, sectional or national.

The practice and concept of practice have advanced, as in dentistry. The mechanical phase has been passed, and today orthodontists view their work from the scientific standpoint. A biologic approach has replaced the mechanical. The private schools, with a commercial, rather than a professional atmosphere, have been replaced by extension of undergraduate teaching, and development of graduate teaching in university dental schools.

THE PATIENT—HIS DENTAL AND ORTHODONTIC REQUIREMENTS

In thinking of the patient and his dental and orthodontic requirements, I am thinking in terms of the child. During the early years of dental practice, even to a time well within that of the present generation, not much attention was paid to the child. His first teeth were considered as temporary (a misnomer) teeth, and were treated accordingly. It has

been said that, in former years, the dentist sent the child to the orthodontist because he didn't know what to do with or for him. But today we have come to a realization of the value of the deciduous teeth, and our treatment is very different. We can successfully treat and fill abscessed teeth; we are infinitely more careful regarding prophylaxis, and our child patients thus gain. We have come to this because of the new knowledge, the result of research and scientific development.

So too, has orthodontia developed. The inanimate sciences have produced better materials, and the life sciences, biology, and its concomitants, have provided a scientific approach to the task. The orthodontist has a fuller concept of the need of dental treatment and of prophylaxis, and here again the child is benefited.

Both dentistry and the specialty orthodontia have developed in the prosthetic field, so that today it is not uncommon to see a child with a prosthetic appliance of some type, the need being occasioned by unerupted teeth, and the appliance temporarily worn, or by missing teeth, in which case there is a permanent need to be met.

We are a long way from the ideal in the realm of prevention of dental disease, so that it will be necessary for some time yet to treat abscessed teeth, fill carious teeth and meet all the other demands that arise in practice.

The whole care of the child's dental outfit requires and will require the combined efforts and skill of the dentist and the orthodontist. There will be many perplexing questions in the ordinary run of cases, but probably the foremost in our minds at the present time is that of retention or removal of partially developed third molars. This is merely an enumeration of some of the requirements of the child patients.

HOW SHALL THESE REQUIREMENTS BE MET?

Just as today there is better cooperation between dentist and orthodontist than obtained a short while ago, in the future it will be still better. This statement may sound a little extraordinary, in view of the recent report of the Curriculum Survey Committee, and their suggestion concerning "simple cases," which has provoked no little discussion. While it will probably be true that more orthodontic treatment will be rendered by dentists in general, or in children's practice, this will, in spite of our questioning now, consist of those "simple cases," resulting in a more valuable service by the orthodontist, and at the same time elevating that specialty to a place of dignity, which it does not now have.

The specialist of the future will more nearly attain that position which is logically his as a man of more mature years, of wider experience in all branches and, consequently, of better judgment in his special field that has been his chief interest during the preceding several years. I shall treat this more fully presently.

SIMPLE AND COMPLEX CASES

There is no rule or set of rules by which we can separate simple cases from complex cases. The line of demarcation is not straight, nor can it be followed to any extent. This, finally, can only be answered in considering the case at hand, and the individual practitioner concerned. It is a common experience in practice that those cases which in the beginning appear to be simple turn out to be most difficult. Sometimes, the opposite happens. In any event, the judgment of the dentist or of the orthodontist must dictate the procedure.

In general, it may be stated that there are many cases of slight expansion, rotation or jumping of the bite of anterior

teeth that may come within the category of simple cases, and might well be handled by the dentist. These can be done scientifically, technically and economically to the satisfaction of all concerned. Such cases are those in which the first permanent molars are in correct occlusion.

As a final answer to the question, we must wait until research and teaching have shown us the situation. And they will.

TRAINING FOR THE SPECIALTY OF ORTHODONTIA

The professional man, like all other men, has, by force of necessity, and an economic outlook on life, been compelled to look to his own needs. This cannot, must not, be overlooked. A profession differs from other enterprises in that the return on investment is counted primarily in terms of successful outcome, or satisfactory result, rather than financial increase. With the question of economic gain relegated to a secondary position in our thinking, we can look out on the future and see our responsibility. From the standpoint of the dentist, the past few years have brought about two developments:

1. People have not been financially able to have adequate service, which means that just as soon as the time comes when it can be had, they will have it.

2. Longevity has been greatly increased (50 per cent over that of ninety years ago). Restriction in immigration and decline in birth rate have also played a part in the increase in longevity, so that today we have 600 per cent more people 65 years of age than fifty years ago, while the population has increased only 146 per cent.[3] This means, from the standpoint of dental education, no small amount of restorative dentistry must be taught, and owing to this fact, certain specialties are sure to develop, namely, exodontia and prosthodontia.

Along with this fact, or these facts, there has been developing within the profession, owing to both the economic and the scientific aspects, a better conception of the need of prevention. This turns attention directly to the child, and another specialty, orthodontia, must be included.

In considering the specialist of the future, there are three questions which come to mind: 1. Who shall be the specialist? 2. How shall he be trained? 3. By what means shall his qualifications be proved?

In answer to the first question, Who shall be specialists? this statement may appear to contradict a previous statement in which it was indicated that the general practitioner will practice more orthodontia than in the past. We cannot expect the general practitioner to do much in this field. He will be too busy with the calls of a general practice upon him. The dental student, with all the requirements of an undergraduate curriculum to meet, cannot add the greater requirements of even one specialty. There remains, then, the need for the establishment of graduate courses of instruction in the specialties, so that those desirous of entering a limited or special field of practice may thus qualify.

This may include some who have enjoyed general practice for a few, or several years, or, and more likely, it will consist of young men, just completing their dental studies. In his address "Trends in Graduate Teaching," Charles Gordon Heyd, M.D.,[4] says:

I wonder if many of the profession have thought through to a logical conclusion what will constitute adequate medical education ten or fifteen years from now. Have

3. New York Herald Tribune, Oct. 30, 1934.

4. Heyd, C. G.: J.A.M.A., 104:1061 (March 30) 1935.

physicians asked themselves the question "What will be the type of professional practice in 1950?" It is evident that there are tremendous changes, turnovers and new adaptations taking place in the social, financial, industrial and economic world. With all due regard to liberal tendencies, and divorcing research and pure science from the domain of the ordinary practitioner of medicine, there is behind every physician an economic problem. It seems to me that the trend is quite definitely toward specialism. More and more young men are entering the surgical specialties. There is no gainsaying the fact that the mechanical arts of the surgical specialties are more highly remunerative than the less dramatic services of internal medicine. This trend is being accelerated by the various certification boards and the establishment for listing as a specialist by a "dead line" in 1938.

In his address on "The Educational Value of Medical Societies,"[5] Sir William Osler says:

> There are many problems and difficulties in the education of the medical student, but they are not more difficult than the question of the continuous education of the general practitioner—over the one we have some control, over the other, none. The specialist may be trusted to take care of himself. The conditions of his existence demand that he be abreast of the times; but the family doctor, the essential factor in the battle, should be carefully nurtured by our schools and carefully guarded by the public.

After analyzing the calls on the physician, and his requirements for keeping abreast of the times, James D. Bruce, M.D.,[5] says: "It would seem necessary, therefore, that a practitioner make provision for acquainting himself with medical progress at least once in each five-year period."

5. Bruce, J. D.: Continuing Education in Medicine, American Scholar 4:244 (Feb.) 1935.

These may be paraphrased by substituting "dental" for "medical," and our case is exactly fitted. Osler suggests that the "specialist may be trusted to take care of himself," owing to the conditions of his existence. This does have an element of possibility, but, in either case, the general practitioner or the specialist must have opportunity for instruction, the one in short postgraduate courses, and the other in longer graduate courses.

If this is the case in medical education, it is equally essential in dental education. In answer to the question then, How shall the orthodontist or the specialist be trained? He will be trained through the establishment of graduate courses at least one year and possibly two years in length.

How shall he be tested? Osler says, "He will take care of himself." The graduate instruction will indicate, in part at least, his qualifications. State boards appear to be, one after another, setting up certification tests, so that, within a very few years, apparently, that will be the answer.

THE TRUE PROFESSION

We have wandered through the years of mechanics and into those of science and art, as a result of which we have come to a fuller appreciation of our relationships among ourselves and with the medical profession, and with those whom we serve. We have developed a real concept of professional service, and have developed dentistry into a real profession. In other words, dentistry has now become a profession, meeting the requirements as laid down by Mrs. Fahs Beck[6]:

1. The occupation must require high skill and intellectual effort, and an extended educational preparation, both intensive and comprehensive in nature.
2. The occupation must involve pri-

6. Beck, Dorothy F.: The Development of a Profession, unpublished data.

for a fee or salary, rather than the sale of material products for a profit.

3. The occupation must have achieved in public opinion traditions of group dignity, intellectual superiority, self-control and resistance to unscrupulous commercialism.

These impose on members of a profession a different mode of conduct; hence, in a new training, there must be included that which will provide for the student not only knowledge and skill of his subject, but also that which will make for his personal adjustment to a new environment. The student is not only the boy in college, but also the man in practice. We must all gain a new vision of the responsibilities that are devolving and will devolve on us, that we may satisfactorily meet them.

Evidence points in that direction, and surely failure will not be ours. We will meet Mills' dictum, that the level of attainment shall be raised and the profession and its specialties, including orthodontia, will be on a higher plane of usefulness. Our star of the East shines brightly. It is ours to follow its gleam.

THE CURVED CUSP POSTERIOR TOOTH*

By H. F. McGRANE, D.D.S., Omaha, Nebr.

HAVE anatomic posterior teeth met our expectations? Owing to the many nonanatomic forms now offered to the profession, we may assume that anatomic cusp teeth have failed to be entirely satisfactory.

When Victor H. Sears first presented the new and drastic change in posterior tooth form, in the channel tooth, considerable surprise was evinced by this extreme divergence from the accepted anatomic posterior tooth. This pioneer step of Dr. Sears has paved the way for a great variety of nonanatomic teeth, with their advantages and disadvantages.

Adjustable articulators and the reproduction of mandibular movements thereon, in conjunction with balanced occlusion, have been enjoying front page publicity during the past fifteen years. During this time, artificial anatomic cusp teeth have been subjected to many changes in order to achieve balanced occlusion and, in the process, cusps have practically lost their identity. This process of balanced occlusion has robbed cusp teeth of their efficiency. After hours of conscientious effort, we have been told many times by our patients, "These teeth are too dull." This deficiency, no doubt, gave rise to the thought that if anatomic teeth had to be altered in every case to effect a better result and did not yet obtain it, there should be some form that could be devised which would lessen the need of alteration to produce satisfactory artificial dentures.

During this progressive evolutionary period through which we have been passing, the minds of many of our colleagues have been chaos. This unsettled condition has favored the nonanatomic posterior tooth.

*Read before the Section on Full Denture Prosthesis at the Seventy-Seventh Annual Session of the American Dental Association, New Orleans, La., Nov. 6, 1935.

MANDIBULAR MOVEMENTS

The mandible, being the movable member, can travel from centric position in the glenoid fossae to the right, the left and any intermediate point, distances that will vary with the individual. It is possible to reproduce these movements accurately on adjustable articulators. These reproductions illustrate the amount of downward, forward and inward movement of the condyle head on the balancing side as well as the upward, outward and backward movement of the condyle head on the working side. These registrations must be taken with baseplates supporting graph plates and tracing pin. (Fig. 1.) These tracings are all registered under stress. The direct lateral movement of the mandible is known as the Bennett movement. To my knowledge, there has never been a record made showing the gothic arch tracing or the amount of Bennett movement with the mandible separated from the maxilla and to the working side and not under stress. The need of recognizing the Bennett movement in the construction of successful artificial dentures, I believe to be a fallacy. This statement is a very important one.

When the mandible has opened and the bolus of food has been inserted, and the mandible has moved to the working side (Fig. 2), the stroke of mastication has begun. The mandible, regardless of its location eccentrically, must necessarily begin to return to its correct centric position in the glenoid fossae. During this movement, the bolus of food is between the opposing teeth and the opposing cusps are unable to make contact with each other until the stroke of mastication is complete. At this instant, the heads of the condyles have returned to centric position in the glenoid fossae.

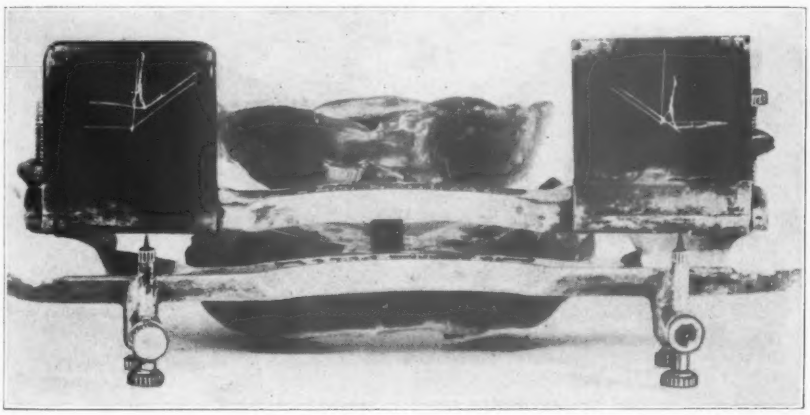

Fig. 1.—Sears' trivet; showing centric jaw relation on articulator and centric relation of mandible to maxillae established by patient.

CENTRIC RELATION OF THE JAWS

Centric relationship of the mandible to the maxilla (commonly and erroneously called the bite) has been definitely settled with graph plate and pin tracing device. (Fig. 1.) If this particular technic were adopted universally, much better results would be rendered our pa-

tients when cusp teeth are used. Do not be misled into believing this technic is too difficult to master. On the contrary, it is very simple. Even though it were difficult, its importance would be sufficient reason that we should employ it. This practical case of centric relation was accepted without the use of a pin tracing device and mounted on an articulator. The tracing device was then attached to the case and the centric relation established on the articulator. Baseplates were then returned to the patient to determine the correct centric relation. The amount of error is very apparent.

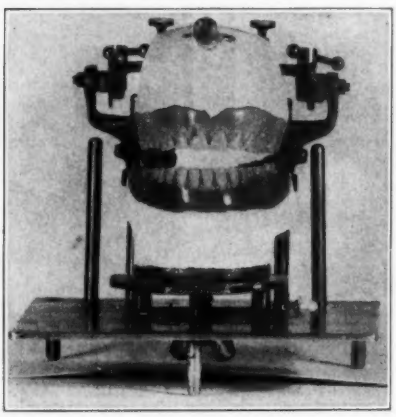

Fig. 2.—Bolus of food on working side, with lack of contact of cusp on balancing side. Balancing cusps are not necessary in full denture construction.

The right and left lateral movements of the mandible as shown with the pin-tracing device illustrate the two rotation centers of the mandible. These rotation centers are the starting and finishing point of all mandibular movement from centric relation of the jaws. These tracings are taken under stress. The movement of the mandible, under stress, to eccentric position does not necessarily indicate that a similar condition will exist when there is a bolus of food between the opposing teeth and the mandible is moving to centric position from eccentric. The stroke of mastication begins in an eccentric position and returns to centric.

If we can accept the pin tracing (gothic arch) technic, and I believe we can, as a proper procedure to establish the starting and finishing point of all mandibular movements from centric; and if these movements of the mandible to the right and to the left inscribe the segment

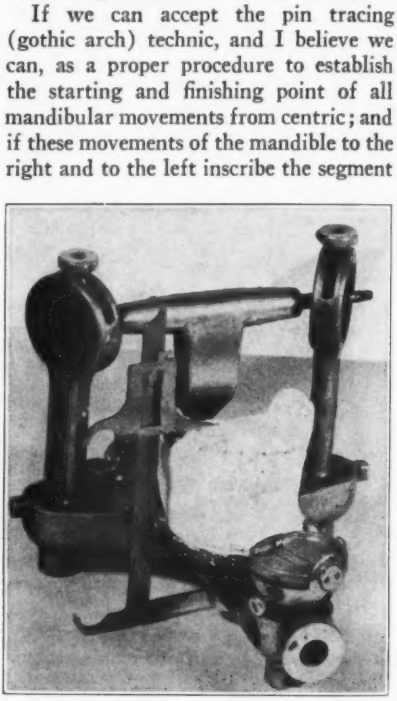

Fig. 3.—Position of horizontal plane found in patients as young as 12 years and as old as 45.

of a circle, why should we not build posterior teeth with cusps to conform to these particular movements? If we construct such a tooth, or teeth, we will discover that we have a cusp tooth, or teeth, with curved grooves and curved cusps, minus balancing cusps. Balancing cusps are not necessary for successful artificial dentures. The presence of occlusal surfaces with curved grooves and curved

cusps, minus balancing cusps, will permit the mandible to move to the right and to the left without cusp interference.

In order to have a balancing cusp that would perform the function implied by its name, we would have to have cusps (Fig. 2) that would increase and decrease their height automatically as the occasion demanded. This is, of course, impossible. This rule would apply to posterior cusps during incision as well as during the stroke of mastication from a lateral position.

laterally a greater distance than was provided for on the incline plane of the balancing cusp. To control the amount of lateral movement is beyond our jurisdiction. We have been endeavoring to do this and we have failed. In order to overcome this difficulty of torsion caused by cusp interference, we should eliminate the balancing cusp entirely and permit the mandible to move freely as it desires. All cases are asymmetrical. All adjustable articulators are constructed on a larger scale than 4 inches; therefore, the

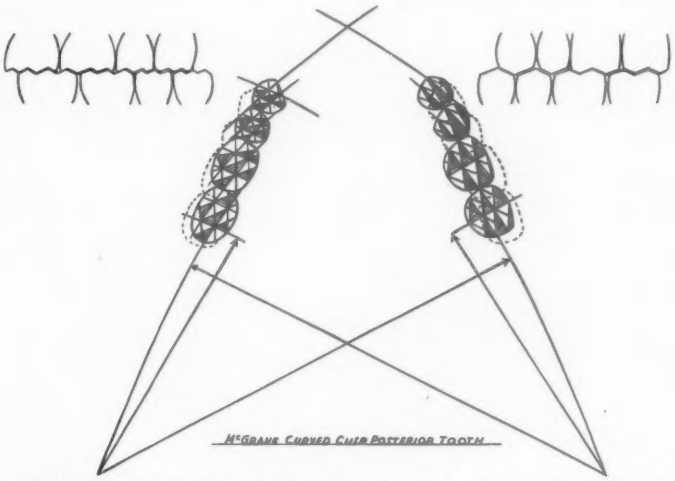

Fig. 4.—Diagrammatic drawing showing curved cusps and curved grooves established from rotation centers located in heads of condyles.

ADJUSTABLE ARTICULATORS

Ever since the adjustable articulator has been accepted as the mechanical device upon which artificial dentures should be constructed, we have been taught to recognize the balancing cusp. This cusp had to be at the same elevation as the degree of downward and inward movement of the condyle head on the balancing side. To prevent cusp interference when the mandible is returning to centric position, the mandible should not move

calculations are magnified proportionately.

BALANCED OCCLUSION

Balanced occlusion of opposing teeth is that position of opposing cusps that offers no interference when the mandible, in function, is moving from extreme right or left lateral eccentric position to centric in the glenoid fossae.

Accommodation of every possible angle of movement of the mandible without

cusp interference is only assured by the use of cuspless teeth.

MANDIBULAR DRIFT

Many ideas have been advanced with reference to the cause of the decrease of the vertical dimension between the mandible and the maxilla. I am not prepared at this time to offer a solution of this problem. I am not willing to accept the theory that cusps cause a locking of upper and lower dentures, a forward drift of the mandible resulting. It seems feasible that if we have acquired the correct centric position of the mandible and the opposing cusps are properly positioned, the stress-bearing areas are called on to withstand the amount of stress directed on them during the process of mastication. If the supporting tissues fail to receive sufficient nourishment to maintain their uniformity, we might expect tissue change. This field offers ample opportunity for scientific research.

It would be very interesting to know the exact amount of time during every twenty-four hours that the opposing cusps are in contact.

DENTULOUS CASES

Many cases, for patients as young as 12 years and up to 45, in which all of the teeth were present, have been mounted on articulators with the use of the transfer bow. (Fig. 3.) All of these cases present a very interesting condition. The arrangement of the teeth indicates that they are of a similar height from a definite base, on the right and left sides.

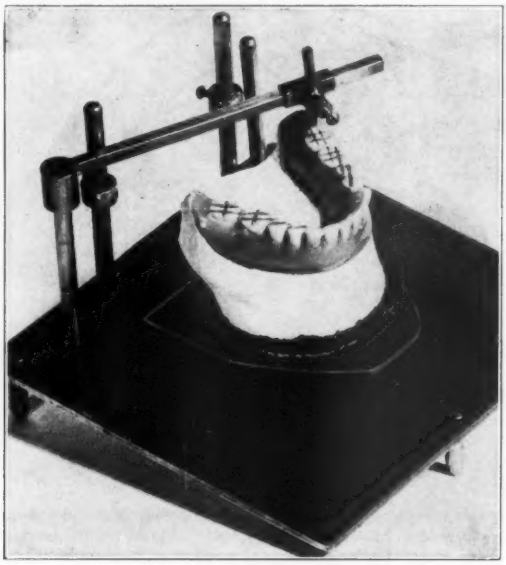

Fig. 5.—Radial arm employed to set teeth in proper relation with rotation centers located in heads of condyles.

TRANSFER BOW TECHNIC

The transfer bow technic is the only

procedure by which to establish casts of edentulous cases properly on articulators with the same opening axis as that existing in the mandible.

Numerous artificial dentures which patients have declared failures have been transferred with the transfer bow and mounted on articulators. The horizontal plane has invariably been found to be

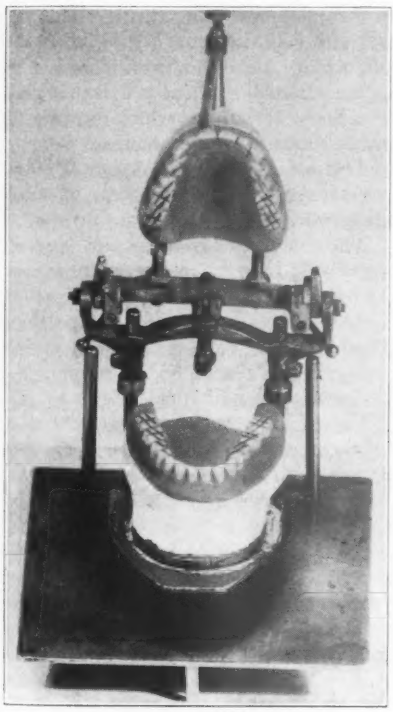

Fig. 6.—Occlusal surfaces of upper and lower teeth. Darkened lines indicate curved grooves.

low on one side or to be inclined downward on both sides in the posterior region of the denture. When setting teeth, with transfer bow technic, it is easy to establish the horizontal plane correctly, as indicated, with the use of the millimeter gage.

REQUIREMENTS OF POSTERIOR TEETH

There are three essentials to be considered in posterior teeth: esthetics, function and phonetics. These are not necessarily named in sequence of importance. Many patients, as well as dentists, will disagree in this respect. The combination of all three essentials should be our objective. The buccal and occlusal aspect exposed to view should be such as to prevent the lay person from detecting any perceptible difference from that of anatomic teeth. The arrangement of the occlusal surfaces should be such that the greatest amount of efficiency will be assured during the process of mastication. The dentures should also conform to esthetic requirements. Phonetics offers little difficulty. The arrangement of posterior teeth over the center of stress-bearing areas will meet this requirement. The height of the occlusal plane is regulated by the esthetic and phonetic requirements of the anterior teeth. Some patients, usually male, care nothing about esthetic values, being interested only in function.

CURVED CUSP POSTERIOR TEETH

The curved posterior cusp teeth are constructed with curved grooves and curved cusps, forming segments of an arc, concentrically arranged from a radial center corresponding to the right and left rotation centers of the heads of the condyles in the glenoid fossae. In Figure 4 the mesiodistal dimension on one side has been divided into halves (first and second molar), the bicuspids maintaining their anatomic form. On the opposite side, the mesiodistal dimension has been divided into thirds. The buccal lingual dimension on both sides has also been divided into thirds. This arrangement of

curved grooves and curved cusps will permit the mandible to move from centric to eccentric position, or vice versa, without any cusp interference. This arrangement will also assure interdigitating, noninterfering cusps that will masticate food with the least amount of pounds pressure necessary. These curved cusps are constructed with planes of a 25 degree elevation. The height of the same cusp, to consider the anterior-posterior movement of the mandible only, indicates an elevation of 15 degrees, owing to the fact that the cusps are on a curve and the anterior-posterior movement would be on a lesser elevation of the plane owing to the direction of movement. These cusps are pyramidal. The curved grooves beginning in the buccal third of the second molars continue on through the occlusal surface of the first molars and emanate from the lingual third of the first molar. The same condition exists on the first molar with the groove continuing on through the second bicuspid. The buccal groove of the first bicuspid and the lingual groove of the second molar are the only grooves that pass through the occlusal surface of one tooth. When the mesiodistal dimension of the bicuspids is cut into thirds, they do not present so pleasing an appearance as if they are beveled to 25 degrees and have only one cusp in this dimension. The same arrangement of curved grooves and curved cusps of the upper teeth will permit freedom of movement of the mandible without cusp trauma. The elimination of the balancing cusp has removed the need of grinding to obtain balance on the articulator. During the stroke of mastication with the bolus of food on the working side and the mandible returning to centric position, there is no possibility of interference of cusps.

In order to set these teeth properly, transfer bow technic should be used, to establish a correct opening axis. I have also devised an articulator with a radial arm extending from the center corresponding to the rotation center of the condyle head. This radial arm is interchangeable from one radius to the other. The guide on the radial arm is movable, being capable of establishing the teeth on the long radius and the short radius from one rotation center and then transferred to the opposite rotation center. This radial arm will also act as a guide to establishment of the horizontal plane. The upper arm of this articulator is that part of a Snow articulator which measures 4 inches between rotation centers.

This arrangement and design of cusps has been used in construction of fixed bridgework as well as partial dentures.

These curved grooves and curved cusps built from an arbitrary center may lead you to inquire, "Will this curvature be adaptable to cases measuring less than 4 inches?" The binding possibility of this type of tooth placed on a case with $3\frac{1}{2}$ radius is about 0.05 mm. (Fig. 9.)

Figure 5 shows the arrangement of a practical case with the curved grooves darkened to display their arrangement. Figure 6 shows the occlusal surfaces of the upper teeth.

CONCLUSIONS

Cusp teeth are necessary to provide the maximum amount of efficiency during mastication.

The arrangement of opposing cusps should be such as to remove any possibility of trauma during functional movement of the mandible.

Posterior teeth must be of such form that they will represent the natural teeth.

The balancing cusp should be removed entirely, as it has been a detriment to successful functioning of artificial dentures.

STATUS OF PERIODONTIA IN THE DENTAL COLLEGE CURRICULUM*

By CELIA RICH, D.D.S., Nashville, Tenn.

IT should be stated at the outset, if indeed it should not properly have been included in the title of this paper, that this presentation was called forth at this particular time by the publication of the Report of the Curriculum Study Survey of the American Association of Dental Schools, and it is in a great measure based on that excellent piece of work.

The fundamental importance of the science of periodontology to the whole structure of dentistry need hardly be emphasized. It is self-evident that the life of all types of operative and restorative dental work depends on the condition of the supporting and investing structures of the teeth. The appearance and the comfort of the patient and, in large measure, his general health are dependent on the health of these tissues, and it has been shown that disease of the periodontium is scarcely second even to caries, if indeed it does not rank first, as a cause of loss of teeth. Diseases of the gingivae and periodontium are about as common in adulthood as is caries in youth, and, in the field of prevention, no branch is more important than periodontia both in the actual prevention of oral disease and in the recognition and elimination of pathologic processes before irreparable damage has been done.

Organizations of specialists and, more recently, a journal dealing exclusively with the subject of periodontia and extensive and valuable research in the mechanics of occlusion, in oral histopathology, in diet and in endocrinology have served not only to broaden the knowledge and make treatment more scientific, but also to emphasize and publicize to a greater extent than ever before the importance of periodontology and its correlation with other branches of dentistry and with general medicine.

Gies, in his memorable survey, envisaged, perhaps for the first time, dentistry as a great health agency. In his view of an enlarged usefulness, the dental practitioner must be an oral sanitarian and oral physician in addition to giving mechanical services, and Gies suggested improvements in teaching and research that would elevate the profession to its rightful place in the promotion of human welfare.

More or less continuously since the Gies report was published ten years ago, the general problem of the dental curriculum has been studied and discussed both in groups and by individuals. R. H. Blanquie, H. J. Leonard and A. W. Bryan, among others, are responsible for much illuminating comment, and I shall quote them freely.

Nothing approaching in comprehensiveness the recent Report of the Curriculum Survey Committee of the American Association of Dental Schools has been essayed. The general observations and

*Read before the Section on Periodontia at the Seventy-Seventh Annual Session of the American Dental Association, New Orleans, La., Nov. 5, 1935.

standards it sets forth cannot be too highly commended.

Not only physicians and dentists but also learned men in the field of general education were engaged in compiling the survey and their influence is felt throughout, perhaps nowhere more impressively than in those paragraphs that refer to the importance of planning the student's schedule with definite and ample hours allotted to outside reading and study, to the end that he be early encouraged in this wholesome and necessary practice, and that he have time to familiarize himself with the research activities that should be in progress in every dental school.

To quote:

> The creation of a desire for continued study after graduation cannot be achieved by any special course in the curriculum, nor by any one thing that is done. Rather, it results from a combination of efforts and circumstances, such as providing an adequate foundation in science and scientific methods, stimulating a spirit of intelligent inquiry, teaching and permitting the student to rely on himself and his own efforts to solve his problems, and putting in his possession the means thereof. . . . An atmosphere of study and research, inspiring teachers, freedom from the vitiating influence of static ideas, and absence of commercial entanglements all have a place in promoting this aim.

The curriculum study is based on the postulate that "the dental conditions of the people create definite needs which it is the function of the dental profession to meet," and the plan of the survey was, first of all, to obtain a comprehensive view of these needs and requirements for oral health service. To this end, the committee reviewed the findings of many exhaustive investigations that have been made in the past ten years.

The United States Public Health Service over a period of three years examined the teeth of 12,435 children between 5 and 19 years of age in scattered and varied communities. In this group, caries was the defect found to be most prevalent, as was to be expected, but gingivitis was far from exceptional even in the younger children, while at 15 the percentage with some degree of periodontal disease was more than 20.

An analysis was made of the records of 100,922 physical examinations by the Life Extension Institute over a period of eight years, and gum diseases were found very prevalent even in the lower age groups; while, between 55 and 60, a considerable proportion had definite pyorrhea. The examinations were made by physicians and probably failed to disclose any but the most obvious cases.

A study at the University of Minnesota reported by Brekhus showed a rapid rate of increase in loss of teeth with added years. At 20, 10 per cent of teeth had been lost; at 40, 45 per cent; at 50, 62 per cent, from all causes. This increase in rate was unquestionably due in large measure to the greater incidence of periodontoclasia in the older age groups. In a further study at the same university to determine the reason for extracting 13,909 teeth in 2,722 patients of ages ranging from 20 to 70 years, even though the younger ages greatly predominated, the percentage of teeth lost from dental periclasia was 32 per cent of the whole, as compared to 26 per cent from caries.

A significant fact was that caries and pulp disease were responsible for the greatest loss of teeth in young patients and pyorrhea was responsible in the older patients. Thus, while 86 per cent of extractions in ages from 10 to 20 were due to caries and pulp disease and only one tooth was lost on account of pyorrhea in these younger people, in the patients from 60 to 70 years of age, pyorrhea ac-

counted for 57 per cent of all extractions.

Other studies confirmed these findings as to the prevalence of periodontal disease, and again we must remember that as the examinations were not always made by dentists, and the roentgen rays were only sometimes used, many lesions were probably overlooked.

It is surprising that, in many surveys of oral conditions, no data are given on conditions of the investing structures of the teeth other than periapical infections and various surgical conditions.

In listing oral conditions that have been shown to be sources of focal infection, the survey gives due prominence to periodontal disease and it also concedes its importance in the field of preventive dentistry. In fact, throughout, the significance of the health of the supporting structures of the teeth is emphasized.

From these data, the obligation and responsibility of dentists with regard to periodontia are clear. Furthermore, these conditions must be met almost entirely by the general practitioner of dentistry. The great majority of all dentists are in general practice. A questionnaire bringing replies from 5,544 dentists throughout the country disclosed the fact that specialists exclusively in all lines constitute only 3 per cent of the whole number of dentists, and specialists in part, 8 per cent. Of the 89 per cent in general practice, many exclude certain branches. Only 32 per cent of the number (of general practitioners) include orthodontia in their work; while 89 per cent include periodontia. In spite of the large proportion who professedly include periodontia in their practice, the time and attention devoted to it in most offices is negligible.

Bryan says:

> Members of the profession who are connected with infirmaries in dental schools see many patients with advanced, serious lesions of the periodontal tissues who say that they have had frequent examinations and have never been warned that there was any trouble with the oral soft tissues. Carious areas have been searched for diligently and been attended to, but the real foundation of oral health has been neglected in the examination.

Blanquie called attention to the fact that "the average dentist very seldom looks for periodontal disturbances in the mouths he examines" and that "when he does, it is very often at the instance of the patient or else when the gums are so inflamed and the pus so noticeable and teeth so loose that he cannot possibly escape detecting the existing condition."

To quote again from Dr. Bryan:

> When a dentist accepts a patient, he assumes a definite responsibility. That responsibility not only involves the search for pathologic processes in the hard structures and the repair of the defects caused by such processes, but includes also a painstaking observation of the supporting tissues of the teeth in an effort to discern the slightest variance from normal. The patient came to the dentist to learn whether the mouth tissues were healthy, not simply to see if there were any cavities in the teeth. He expects at least a warning if the soft tissues are not healthy, and if the dentist overlooks the slightest hyperemia of the marginal gingivae or congestion of the pericemental membrane, or considers such changes too slight for treatment, the patient spans the interval until the next visit with a false sense of security as to oral health.

Who among us has not had the following experience? A patient who has had periodic dental attention all his life comes in, and even a cursory examination reveals a generalized gingivitis with evidence of subgingival accumulations. A blunt probe discloses deep pockets about many of the teeth, some of them in such an advanced stage that extraction is nec-

essary. Carelessness in examination of the soft tissues and faulty or delayed diagnosis had overlooked these lesions while they were still in the treatable stage. In the same mouths, wrecked by neglect of the supporting structures, restorations of a high order of excellence are found, indicating many hours of work by skilled operators.

"A tooth saved from destruction by dental caries is only half saved if it is allowed to be lost prematurely because of neglect of its supporting tissues." (Dr. Bryan.)

There is ample evidence that the lay public is beginning to sense the neglect of the oral soft tissues, and it is not unusual to have a patient come in and call attention to his own gums, with the remark that "Dr. So and So" (the other dentist, of course) had said they were all right, "but doctor, what does this mean?" indicating an area or a tooth obviously in need of periodontal care. We may yet become educated periodontists through our patients' demands. As we have said, these cases are not exceptional: we all see them constantly.

We must concede that the average dentist is not shouldering his responsibility in caring for the health of the periodontium. Where shall we look for causes of this apathy or indifference to a fundamental branch of dental science? Wherein lies the fault? We cannot but subscribe to the opinion that it is in a large measure due to "a lack of instruction on which a bad psychology is engrafted." In part, at least, the fault would seem to be in the dental college.

Quoting Dr. Bryan again:

It is obvious that the attitude of men after entering practice is the result of training received there, and before we can expect an improvement in the attitude of the majority of the profession towards periodontology, it will be necessary for the colleges to recognize its importance and give adequate time and attention to its teaching.

It has been shown that periodontia is practiced largely by the general dentist; thus, it is obviously the function and responsibility of the undergraduate curriculum to take care of the training in the subject. Here, we cannot do better than quote from the Curriculum Survey as to the objectives of undergraduate dental education:

The objectives of undergraduate dental education depend upon the oral health needs of the public, and the responsibility which modern dentistry is called upon to assume. The program of undergraduate dental education should aim at training students in order that they may: (a) be competent in the maintenance of oral health and the treatment of oral diseases, disorders and deficiencies with understanding and appreciation of the relationship between oral and systemic conditions in health and disease; (b) co-operate effectively with persons engaged in allied fields of service; (c) have interest in and desire for continuing professional study after graduation; (d) practice dentistry with due regard for its social, economic, and ethical relationships, and (e) co-operate effectively in community life.

These are altogether commendable pronouncements, but their application is far from simple.

It is unfortunate that many men select dentistry as a calling largely because of some supposed mechanical knack or passing inclination, and to them, naturally, operative and prosthetic restorative work have an especial appeal that periodontia admittedly lacks. Perhaps they share the opinion of many of our patients that those services are most important and valuable in which precious metals are used.

Periodontal treatment is not specific nor spectacular; it is not confined to any single operation, but it requires judgment of a high order and a broad knowledge

of all the other branches of dentistry and medicine. We quote again from the Survey:

It is well known that many students who enroll in dental colleges have little or no conception of what is involved in the practice of dentistry, or in the pursuit of dental education; some of them have had very little contact with dentistry. Certainly, only a few have made a sufficient investigation of the curriculum outlined in the dental school catalogues to know what branches are to be undertaken in the way of study, and, what is more important, why the various subjects have been included. Moreover, there are found among entering dental students some whose motives for desiring to become dentists are open to criticism. To set these uninformed and misinformed students right from the start is a need that deserves earnest consideration for the sake of both the individual student and the dental school. The student should be brought to realize that dentistry at its best is a profession with high ideals and that his development as a scholar and a dentist is dependent upon this point of view. It should be an aim of dental educators to improve the attitude and outlook of the student and to develop professionalism from the beginning of his dental training....

One of the characteristics of a profession contrasted with a trade is that it is practiced primarily for motives other than economic gain; this is particularly true of the health professions. Presumably one who enters the dental profession accepts the responsibility for doing what he can to promote the health of the people. The state indirectly protects the profession in its service, by preventing anyone else from rendering dental service to patients and this protection is jealously guarded by the profession.

With a proper weeding out of prospective students, the teaching problem will be immeasurably simplified, and the more thorough predental requirements should still further simplify it.

Dr. Leonard says:

Periodontia is not difficult to teach to those who desire to learn it; its difficulties are mostly the psychological ones, arising from the fact that most dentists and dental teachers are interested in mechanical procedures and are not interested in the biological aspects of dentistry. By lack of interest on their part over a long teaching period these others neutralize the efforts of the teacher in periodontia who tries to create within the student in a short teaching period an appreciation and interest that will make him zealous in this regard for his patients.

The Survey Committee has subdivided the various phases and aspects of dental service into seven principal groups, as follows: (1) diagnosis, including treatment planning and radiography; (2) prevention in dentistry; (3) operative dentistry; (4) orthodontics; (5) oral medicine; (6) oral surgery and anesthesia; (7) dental prosthetics. Mouth hygiene and oral prophylaxis are listed separately.

It is not the intention nor is it possible in the scope of this paper to detail the teaching and time suggested in the Survey, "for an adequate undergraduate curriculum in the light of human needs"; for all these departments of dental science, but I shall take a few specific subjects for comparison with periodontia. This, as has been noted, is not *per se* among the major subjects listed.

Periodontia, under the subtitle, "Diseases Involving the Gingivae and Other Periodontal Tissues," is included in the general subject, "Oral Medicine," the other subtitles being: (1) "Diseases of the Dental Pulp and Peri-Apical Tissues," and (2) "Lesions of the Lip, Cheek and Tongue and Other Lesions of the Mouth Which Do Not Require Surgery."

"Treatment of the diseases of the

gingivae and other peridental tissues" is further subdivided into (1) investing tissues of the teeth; (2) calculus; (3) general description of diseases of the gingivae; (4) atrophy of gingivae; (5) gingivitis, other than acute ulcerous, and proliferative; (6) proliferative gingivitis; (7) suppurative pericementitis; (8) loosening and drifting of teeth. To all the foregoing and the following, "other lesions of the mouth": stomatitis, glossitis, diseases of the salivary glands, and anomalies of salivation," is allotted twenty class hours, while to "the treatment of pulp and the pulp canals," eighteen class hours and thirty-three laboratory hours are given. In the clinic, it is estimated that from 180 to 200 hours will suffice for all the subjects embraced under "Oral Medicine."

The Survey, in planning the curriculum, does not, we think, adequately correlate other branches that logically should be taught in close association with periodontia. We refer particularly to oral histopathology, diagnosis, mouth hygiene and prophylaxis.

The accompanying outline shows the time allotted to the oral medicine group as compared with certain other subjects.

It will be seen that while periodontia as a specific subject is given the meager time indicated (something less than twenty class hours and an indefinite amount of clinical time), to orthodontia is allotted sixty-four class hours, sixty hours of laboratory and two hundred forty hours of clinic. This in spite of the fact that orthodontia is practiced by less than one third of all engaged in general practice, while 89 per cent of all general practitioners include periodontia in their work. To "Radiography" sixteen class hours, eighteen laboratory hours and thirty clinic hours, and to prosthesis, ninety-six class hours (and these are distributed over all four years), 416 laboratory hours and 475 clinical hours are given.

From this suggested curriculum, one

Department of Oral Medicine: 180-200 clinical hours,	38 laboratory hours,	32 class hours	
A. Diseases of pulp and periapical tissues:	33 laboratory hours,	12 class hours	
B. Diseases involving the gingivae and other peridental tissues			
1. Investing tissues of teeth			
2. Calculus			
3. General description of diseases of gingivae			
4. Atrophy of gingivae			
5. Gingivitis, other than acute, ulcerous and proliferative			
6. Proliferative gingivitis			
7. Suppurative pericementitis			
8. Loosening and drifting of the teeth			20 class hours
C. Lesions of lips, cheeks and tongue, and other mouth diseases not requiring surgery			
1. Stomatitis			
2. Glossitis			
3. Diseases of salivary glands			
4. Anomalies of salivation			
Department of Orthodontia:	240 clinical hours,	60 laboratory hours,	64 class hours
Department of Radiography:	30 clinical hours,	18 laboratory hours,	16 class hours
Department of Diagnosis and Treatment Planning:	120 clinical hours,		29 class hours
Department of Prosthesis:	475 clinical hours,	416 laboratory hours,	96 class hours

might judge dentistry to be a mechanical science rather than a branch of the great healing art. In fairness to the authors or compilers of the Survey, it should be stated that the time estimates are based on methods of teaching employed at the present time, and it was not the intention, the Survey states, to present a final curriculum in dentistry.

> No such curriculum can be prepared now or at any other time. No course of study, however well it may be designed, or however solid may be its foundations can ever be final. Constant adjustment of the materials of instruction to new principles and needs is a problem that is ever present with the progressive educator. . . . Any conception that regards undergraduate dental education as a terminal episode will narrow the scope and character of the dentist's professional activities and keep him from performing his full duty to the public.

After reading the Curriculum Survey Report, it was a natural impulse for one interested in the subject to desire to investigate for himself and more specifically the periodontia teaching in the different schools throughout the country. Of course, it was not possible to visit all the colleges or even to interview any great number of recent graduates, but the catalogs of thirty-four dental colleges were secured, and the information gleaned from them confirmed the impression given by the Survey that the evaluation of periodontia in the average undergraduate curriculum is far from commensurate with the importance of the subject.

In ten of the catalogs, there was little or no mention of periodontology, in either the faculty or the schedule, or in the description of courses of study, and in one of these ten, there were sixty-two senior students in last year's class. In another, where there were ninty-four seniors in the 1934-1935 class, only one lecture a week for one semester of the last year was devoted to periodontia. In one of the catalogs, in which apparently no time was allotted specifically to periodontia, there were professors of jurisprudence, metallurgy and ceramics, as well as the usual professors of prosthetic and operative dentistry, and orthodontia. It is not unusual to find radiography and orthodontia taught by "professors," while "instructors" and "assistants" teach preventive dentistry and periodontia at the same school.

Comparatively few of the colleges dignify the science of periodontology with a professorship. Ten, to be exact, have in their faculties special professors or assistant professors of periodontia. In the remainder, this science is taught under the various departments of operative dentistry, oral pathology and histology, clinical pathology and therapeutics, materia medica and therapeutics and oral hygiene and prophylaxis, and, in most instances, by assistants and instructors and not by the heads of the departments.

As far as could be learned, there are very few colleges that carry the teaching of periodontology through three years of the college course, and, in the majority, the didactic teaching is given in only one year. There was no way of learning how much clinical work is given in periodontia, for even when such clinical instruction was mentioned, the time allotted to it was usually divided with many other subjects, without specification of a definite clinical assignment or graduate requirement in periodontia.

Early in this paper, I voiced the sentiment that the reason for the neglect of periodontal pathology by practitioners of dentistry was largely the inadequate teaching on which a bad psychologic attitude was ingrafted. I maintain that the underemphasis on periodontia in the catalogs has in itself a very bad psycho-

logic effect on the student; nor can I believe that the actual teaching is emphasized to a greater degree than the promises of the catalogs would lead one to believe.

Let me not be misunderstood: A few of the dental colleges have adequate, thoughtfully planned courses of study in periodontia, which only the most exacting would have the temerity to criticize. For the rest, the fault seems to lie not only in the too few hours given to periodontia, but also, and particularly, in the approach to the subject. The dental student should not have to wait until his senior year to be introduced to periodontology, or indeed until his junior year.

Oral hygiene and prophylaxis, oral histopathology, therapeutics, diagnosis and treatment planning, with periodontia, form a natural subject grouping. At the outset of his dental studies, simple courses in oral hygiene and prophylaxis are sufficient. The basic sciences of oral histology and pathology and therapeutics can and should link didactic teaching with practical problems. The work in oral diagnosis and treatment planning serves further to emphasize the importance of periodontia and its correlation with the basic sciences as well as with other clinical branches; and thus the student, by gradual and natural stages, reaches the specific study and treatment of periodontal conditions in his later college years. Dr. Gies stresses the necessity for the continuity of these courses throughout the college years and aptly and graphically says that "they should lie vertically, not horizontally, in the curriculum."

SUMMARY

Periodontia is practiced almost entirely by general practitioners of dentistry and therefore should be well taught in the undergraduate curriculum.

Periodontia is fundamental to dental practice and pervades the entire science and practice of dentistry and should be taught in some of its branches continuously throughout the dental course.

With the ever-increasing knowledge of the interrelation of periodontia with all other dental sciences, its complete divorce from the rest becomes increasingly difficult.

The dental colleges, for the most part, underemphasize periodontia teaching, as does the Curriculum Survey Report of the American Association of Dental Schools.

The school catalogs are too casual in their mention of periodontia, and lower the dignity of the whole profession of dentistry when they fail to give to teachers of this branch the status on their faculties that its importance demands.

A careful weeding out of students undesirable for professional training in a great healing art, plus a careful selection of "teachers with a high appreciation of the scientific and health implications of dentistry," will do much toward overcoming the apathy and indifference to the practice of periodontia existing at present among the great mass of the profession.

FUNDAMENTALS OF PARTIAL DENTURE DESIGN*

By R. W. TENCH, D.D.S., New York City

THE replacement of a tooth in a rake or a harrow is a simple mechanical procedure which any country blacksmith or ordinary mechanic can easily accomplish. He needs to know how to weld and to shape metal. There is no life in a rake or a harrow, so there is no biologic problem involved. What may happen to one metal tooth cannot possibly affect any of the others. If a weight of several pounds were exerted continuously on one of the metal teeth, no effect would be noted, no matter how long this condition existed. The metal tooth could not be shifted.

The replacement of missing members of the human dentition with artificial substitutes is not a similar simple mechanical problem: it is a decidedly complicated one, calling for a thorough appreciation of biologic facts that rigidly circumscribe and limit mechanical procedures. In the laboratory, working on dental casts, our problem may appear to be identical with that of the smith. In the mouth, it inevitably turns out to be quite different. Human teeth can be induced to change position to the detriment of the integrity of the whole dental mechanism.

To detect the faults in what we attempt, we must critically survey our efforts. There is plenty to criticize, as the path of partial denture prosthesis is littered by failures, which have their origin in the inability of some technician to realize that his appliance is being made to be worn in a mouth, the tissues of which are not like the steel of a rake or harrow, but are susceptible to change with the slightest modification of their environment. Weight and spring tension will move human teeth and cause them to become loose.

It has repeatedly been said by some of those reputed to be authorities that partial dentures are a slow, painless means of extracting teeth. This is a statement of fact, if proper design is not employed, but it is also an indication of its author's failure to appreciate that what may work on a rigid unchangeable cast may be decidedly improper in the mouth.

If we will come up out of the slough of the blacksmith's state of reasoning to the more solid foundation built of the rocks of biologic facts, much damage that would otherwise be done can be avoided.

Perhaps the greatest evil that has befallen us as a profession is the readiness with which we have abandoned the designing and building of prosthetic appliances to the dental technician. The technician does not have the opportunity to observe the results produced by the designs that he employs and so, it seems, comes to feel that if it works in the laboratory, it must be all right in the mouth. Technicians are not to blame for the fact that their foundation training has been inadequate to fit them to be dental en-

*Read before the Section on Partial Denture Prosthesis at the Seventy-Seventh Annual Session of the American Dental Association, New Orleans, La., Nov. 5, 1935.

gineers. Many dentists have had adequate training, but do not use it.

Had the dentist continued to be technician as well as operator; had he not narrowed his domain to the operating room, where, along with operative procedure, he sells his patients devices, for which he measures them and which he delivers for a fee; had he not decided to increase his selling ability and so to pad his income, he might have gradually evolved out of experience devices that need not be referred to, except in extreme instances, as a slow means of extracting teeth.

Any appliance that we place in the mouth is potentially a means of applying force to the tissues covered, and to the teeth supporting and opposing the appliance. This force originates both in the weight of the appliance and in spring tension arising from incorrectly planned clasps. Force applied to mouth tissues causes change in these tissues if the force is too great. If it is unbalanced or if it is not neutralized, the change may destroy the integrity of the dental mechanism or of its individual members. If the tissues are healthy, they may resist, even withstand, destructive force for a surprising time. When the tissue resistance is below normal, the effect of destructive force on it is sometimes alarmingly rapid.

Mouth tissues vary greatly, from patient to patient, in their ability to tolerate force to which they are subjected by the placing of appliances in the mouth. This variation undoubtedly arises from some organic or glandular condition which, reflected, produces a change in the health and vitality of the individual cells of which the tissues are composed. Whatever the condition of the mouth tissues that we observe, it is but a visible reflection of the actual condition of the cells of which the tissues are composed.

The loosening of teeth from loss of bony support and the decay of teeth are not in themselves primary diseases, but are a reflection of disturbed normal function in a region remote from the teeth.

If the blood stream does not contain the needed nourishment for the dental tissues, or if it is contaminated with poisons which interfere with cell function, the result may be varying degrees of loss of periodontal bone or decay of the tooth structure.

Healthy tissues possess an ability to recuperate or adjust themselves to an injury that sick tissues do not possess. From the nature of things, all dental operations are performed on tissues that, at the time of the operation, are not healthy or which, at some previous time, have not been properly nourished. As the very fact that a dental profession is needed is based on the subnormal level of nutrient or protective elements in the blood, so the tissues on which we operate and place appliances often are lacking in resistance and recuperative power. We, therefore, must treat them with consideration and direct our efforts toward their stimulation and preservation. This objective necessitates a pause for thought and, to many, a radical reformation in thought and in procedure.

Dental disease may be arrested when the internal nourishing mechanism, through a fortunate combination of circumstances, returns to normal. If this change occurs shortly before or during treatment, we naturally suppose that the treatment is correct. The fact that appliances, no matter how viciously designed, are not always destructive is undoubtedly due to such resolution. We are not, therefore, justified in ordering procedures by a review of our success with such normal types. To be on the right side, we must accept the most unhealthy foundation as the basis of criticism, knowing that designs that will not

irritate or be destructive to this foundation will be much safer for the occasional normal tissue that we encounter.

Application of weight or force produces change in dental tissues. The less normal the cells, the more marked the change. Weight should be reduced to the minimum consistent with necessary strength and rigidity. Force arising from spring arms should be eliminated entirely when possible; and it is possible in the majority of instances.

Weight in saddles accelerates settling. Occlusion is lost and excessive masticating pressure must be exerted on remaining teeth to their embarrassment and injury.

Weight, and pressure produced by spring tension, in clasp appliances produce alteration in mouth tissues. Of the two, spring tension is the more vicious. The orthodontist makes his living by utilizing and directing the application of spring pressure to produce tissue change. Makers of partial appliances too frequently blindly misuse the same principles that the orthodontist uses. The misuse of spring tension on teeth is usually accompanied by the destruction of tissues investing the teeth; which permanently loosens the affected teeth.

Given replacement teeth properly articulated, the internal attachment, as exemplified by the Chayes buccolingual attachment, is the least apt to cause loosening of abutment teeth. We can take a cue from the behavior of this form of retaining device to design clasps more sensibly. In the original Chayes attachment, there was no spring tension exerted. It was intended that retention be accomplished by friction of parallel gliding members so disposed in their respective teeth as to bring friction into play only to prevent the dropping of the appliance out of position in masticating adhesive substances.

Many years ago, I conceived the idea that the ideal tooth to clasp would be one that was a true cylinder in peripheral form. If two or more teeth are to be clasped, the ideal would be to have all teeth true cylinders and the cylinders so arranged as to have their walls exactly parallel to one another.

Now a band or flat clasp metal could be so fitted to a cylinder as to glide gently up or down on it. With two cylinders and two bands connected with each other, with a lingual bar and saddles supporting teeth, we would have a theoretical partial lingual bar denture that could be slipped gently into place and held securely without spring pressure but by friction only. Such a device would not need stressbreakers because it could be fitted just loosely enough to settle slightly under masticating pressure and return to a floating state upon the supporting mucosa when this pressure was not applied. Such a partial denture would be a parallel to a properly designed prosthesis employing Chayes' original buccolingual attachments.

About the same time, I was confronted with one of those lingual bar lowers that just could not be made comfortable. The various occlusions and the articulation seemed to be correct and the saddle margins did not impinge on muscles or interfere with their activity. There was no visible localized trauma, but there was a general constant feeling of discomfort. The abutment bicuspids were markedly ovoid or bell-crowned teeth. The clasps were made to grip the teeth slightly; that is, the clasp arms were closed slightly at their outer ends when the appliance was out of the mouth. The clasps thus exerted spring pressure to develop friction to hold the appliance in place. It occurred to me that if I adjusted the clasps to just glide onto the abutment teeth without an opening movement of their

arms occurring when they were seated, the clasps, being like a buccolingual attachment without spring tension, the binding on the surface of the abutment teeth could not shift the saddles on the mucosa. By repeated and careful manipulation under a 2 X binocular loupe, the clasps were finally so adjusted and enough improvement was felt by the patient to justify the experiment, but the lower denture was easily lifted in masticating, because the clasps, being flat surfaced (made of 13 gage, so-called half round wire), while the tooth surface was convex, there was merely line contact of clasp to tooth. To overcome this, a new study cast was made of the mandibular ridge and teeth. This was placed on a clasp surveyor and the bulge of the abutment teeth was mapped in parallel. With this cast as a guide, a cylindrical stone in a true right angle handpiece was used to reduce the curvature of the greatest diameter of the bicuspids to a flat surface about the width of 13-gage half-round wire. To do this, it was not necessary to cut through the enamel. A cut probably not more than one fourth the enamel depth would be sufficient to produce flat parallel clasp-seating surfaces on the two abutment teeth. The width of the seating surface of the clasp on the abutment tooth is about 0.75 to 1 mm.

Impressions of the abutment teeth were made, and half-round wire clasps with rests constructed, to make contact with the parallel tooth surfaces with velvety friction. The clasps were examined and individually fitted to the abutment teeth in the mouth, then an impression was completed with the clasps in position and a new bar lower constructed. The results were very gratifying. After two visits, the appliance was worn comfortably. Since that time, I have made many appliances with clasps so designed; in fact, I rarely make any other type. In ten years, I have observed only three abutment teeth that have become loose owing to clasp trauma. When we consider the unfavorable position of many teeth that must be used as abutments, this is not a bad record.

Since adopting the principle of wide friction contact of semirigid clasps, of half-round wire, minus spring tension, I have designed many appliances to replace those having clasps of other design with improved health of abutment teeth that had been loosened by clasps designed with spring tension. Observing these cases has forced me to some conclusions which, for brevity, I will state arbitrarily, without explanation.

Clasp arms should not embrace tooth surfaces that are inclined so that settling of the ridge surfaces will cause the lower margin of the clasp to impinge on the inclined tooth surfaces. When such a condition is met, the mesiodistal arm clasp should be substituted for the conventional buccal and lingual arm clasp. This applies especially to lower second or third molars that incline lingually. Here, the clasp arms embrace the mesial and distal surfaces of the tooth, passing from mesial to distal aspect along the prepared lingual surface of the tooth. This type of clasp with a bladelike mesial arm is often used on labially inclined maxillary cuspids and bicuspids and for esthetic reasons as well.

Clasps should be designed of metal having sufficient bulk to withstand deforming by casual handling of the patient in removing or cleansing; that is, they should be rigid.

This can be done only with half-round wire or cast clasps and eliminates all forms of round wire clasps. Delicate round wire clasps are the most injurious and pernicious devices that dentists put into mouths.

Except for the skill required, wrought

half-round wire or other similar clasps are to be preferred to all others from the standpoint of both decay and trauma.

All clasps that snap on are injurious to abutment teeth, especially if, after they snap into position, spring tension is exerted by either arm or both arms.

Clasp arms should be so placed when possible that the lingual and buccal arms are at the same vertical level on the tooth; that is, so that one arm is not near the occlusal and the opposing near the gingival aspect. The latter arrangement, especially if 19 or 20 gage round wire is used, is an efficient tooth loosener.

Up to this point, I have touched on one means of reducing tooth dysfunction from clasp trauma. Another important factor in partial denture design is the elimination of weight trauma from excessive use of metal particularly and from unbalanced weight distribution. This is a factor that, as far as I have observed, is usually totally overlooked. If its value is appreciated, it may be used as a means of prognosis when it cannot be utilized. I refer to the distal extension unilateral type of maxillary partial denture, which any one will admit is frequently very troublesome, even when the full palate is covered to bring atmospheric pressure retention into play. Such devices are usually examples of extreme, unequal weight distribution.

You can no doubt recall many successful partial restorations in your own practices. Of all the successful ones, are not the majority to be found among those which have identical abutment teeth on the right and the left and consequently replace identical teeth on the same sides, right and left?

Imagine a maxillary case with perpendicular cuspids not too ovoid or of square type, second molars standing upright and symmetrically placed with both first molars and all bicuspids to be replaced. Suppose a bilateral appliance with palatal bar retained by four clasps were used here: The center of gravity of this appliance would be near the median of the palate. The dead weight of the appliance would be borne equally by all abutment teeth, or perhaps the molars would take a slightly greater load than the cuspids. The load borne by individual teeth would be nearly the same. The important factor in this illustration is that the weight of the appliance is so distributed that the appliance tends to drop evenly out of position, not to pull sidewise on one or more abutments. The success of this appliance is due to symmetrical weight distribution and vertical strain on the abutment teeth. Take the clasps off one side of this appliance, and how would it work? We would then have unequal weight distribution, unsymmetrical balance.

Let us consider another type of symmetrical maxillary case: The first bicuspids are present on the right and the left. All posterior teeth are missing. Here, the case is usually designed with a palatal bar of varying width connecting the right and left saddles. A more ambitious designer would run a strip of metal forward on the palatal mucosa of each side to engage a rest on each of the cuspids or on the bicuspids to prevent the back of the appliance from dropping. These cases are usually fabricated in metal and porcelain, and when resistance rests are taken on the cuspids, the appliance becomes a form of orthodontic appliance because the weight of the real appliance tips the rest arms upward, always against the cuspids except when the appliance is in use.

It is my opinion that resistance rests should be used only to prevent an appliance shifting in function, but not to keep it from tipping out of position. If this

case were designed with a horseshoe connecting bar of metal and the saddles made of "luxene," rubber or other excellent plastic, it might be so put together that the horseshoe connecting surface of metal would be just heavy enough to counterbalance the saddles and so cause the appliance to hang vertically on the clasped teeth without either front or back tipping; that is, to be evenly suspended because of equal weight distribution anterior and posterior to the clasps. The weight in front of the clasp might with judgment be made to exceed slightly the weight back of the clasps.

Lingual bar lowers supplying two second molars are usually a nuisance because they are not built to balance; that is, the bar in front of the clasps outweighs the saddles and tips them out of place. Here is the one case in which a partial denture, if it must be used, might justifiably be made with metal saddles so that the saddle weight would counterbalance the bar weight. This would give the same total weight as if perhaps a continuous lingual rest were used and would not be so inconvenient for the patient to use or so fraught with danger of tooth decay or displacement.

These two ideas may not be new. I do not claim that they are. I have never seen them mentioned. They are new to me, and are employed constantly with quite pleasing results. I present them as ideals which we may strive to approach. Quite frequently, we find cases in which they can be applied. I recommend to you, then, for study, these two suggestions: partial dentures with balanced weight distribution and nonspring-tension, rigid friction grip clasps fitted to paralleled tooth surfaces.

745 Fifth Avenue.

A RADICAL TREATMENT FOR CHRONIC OSTEOMYELITIS*

By DON CHALMERS LYONS, M.S., D.D.S., Ph.D., Jackson, Mich.

THE usual treatment for chronic osteomyelitis with its attendant suppuration is generally unsatisfactory because of the long period of time elapsing between onset and cure. This duration of symptoms must be due either to the present conservative method of treatment of the disease or the fact that the ideal method has not yet been found.

Osteomyelitis must be looked on and treated as a disease of bacterial origin to be appreciated in its true light, and not simply as a necrosis or inflammation of the jaw bones. The disease is the result of the migration of living bacteria from an infective focus, either by direct extension or through the blood stream. The subsequent destruction of the bone is entirely due to this invasion and the production of toxic matter by the bacterial colony. The presence of the invading micro-organisms, such as *Staphylococcus pyogenes-aureus, Staphylococcus pyogenes-albus, Streptococcus hemolyticus, Bacillus influenzae* and *Bacillus ty-*

*Read at the Seventeenth Annual Meeting of the American Society of Oral Surgeons and Exodontists, New Orleans, La., Nov. 1, 1935.

phosus, usually produces pus. The same bacteria that produce bone necrosis cause fever and inflammation.

We must consider necrosis produced by bacteria as an escharotic action and chemically similar to the action that might be produced in the bone by the injection of phenol, nitric acid, etc., or the reaction products of the organic acids produced by bacteria. We have been in the habit of thinking of the substances produced by bacteria as poisons, toxins, toxic products or substances of an unknown nature that act in a mysterious way. A different point of view will clear up much of the misconception arising regarding the mechanism of necrosis in osteomyelitis and lay the foundation for a different method of treatment.

Biochemical study of bacterial life has demonstrated that these toxins or bacterial products are simply organic acids of known structure and chemical activity. They dissolve the bone or disintegrate it when their concentration is such that they act on or are acted on by the organic and inorganic constituents of the bone, destroying the bone and reducing or oxidizing the acids. This causes a theoretical dilution of the chemical compounds for a short time, but as many of the reaction products thus formed are bacterial food, bacterial growth continues and the concentration of toxic acids is maintained at a point where more bone is destroyed, and so on in a continuous process, unless sufficient drainage is established to prevent this concentration.

The micro-organisms causing osteomyelitis invade the bone in a very definite manner, as pointed out by Lexer and Erich,[1] invading the bone through the blood supply and lodging in the capillary ends or loops. In other words, we must look on osteomyelitis as essentially a multiple osteothrombosis of the embolic or infective type. When the disease is considered on this basis, this method of treatment of the chronic state suggests itself, that is, a surgical procedure similar to that for a thrombus; namely, removal and prevention of extension.

Because of the recognition of the bacterial origin of osteomyelitis, treatment has been conservative, but little if any distinction has been made between the acute and chronic stages. In the acute stage, the usual treatment for infections should prevail; that is, early drainage at the point of greatest fluctuation, the use of hot magnesium sulphate packs, etc. No operative procedure is advised until fluctuation develops. In most cases, the acute symptoms subside in from two to three weeks. Then, with the usual method of treatment of dental osteomyelitis, the procedure is a long period of watchful waiting for something to happen; mainly, for sequestra to appear, which are then removed with a minimum of surgical effort. Another period of waiting, and another sequestrum is removed, and so on, until, many months later, the patient is dismissed as cured.

This procedure is neither practical nor economical in any type of practice, particularly in an institutional consultation practice, where one is called at long intervals, and then is supposed to do all that is possible at a single visit.

What might be called a radical treatment for chronic osteomyelitis therefore originates of necessity in certain types of practice. It was carried out to a limited extent during the World War and more recently by Miltner and Wolfe in China.[2] In my experience, it seems to be a very satisfactory method of cutting short the period of the disease. Cases that it has

1. Lexer and Erich, in Bevan, A. D.: General Surgery, Philadelphia: D. Appleton Co., 1908, p. 243.

2. Miltner, L. J., and Wolfe, J. J.: Surg., Gynec. & Obst., 59:226 (Aug.) 1934.

usually taken as long as two years to cure[3] now yield in a very few months. For example, Miltner and Wolfe report that with their radical treatment in chronic cases, cases were dismissed at the end of three months as opposed to six and a half months with the old conservative methods.

TREATMENT

The following case illustrates the surgical procedure advised, and that which was carried out as soon as the chronic stage of the infection was definitely established.

A man, aged 36, colored, was sent to the institution hospital with a badly swollen right cheek, complaining of considerable pain and pus draining from the gums in the region of the lower first and second molars. Roentgenograms revealed an extensive osteomyelitis involving the mandible from the cuspid region backward and into the ascending ramus.

An incision was made in the cheek at the point of fluctuation and a rubber drain inserted. Hot packs were placed on the face. This treatment was continued for ten days, until the acute symptoms had subsided, at which time the following procedure was instituted: After careful sponging of the infected side of the face with a solution of mercuric chloride and alcohol (pure alcohol is not allowed in the institution), the operative area was painted with an antiseptic solution; in this case, colloidal iodine. Then, an external incision was made along the lower border of the mandible at the neck-facial line, extending from a point corresponding to the mesial surface of the right mandibular lateral incisor to the angle of the ramus, taking in the previous incision, made during the acute stage. The incision was then carried to the lower border of the mandible by blunt dissection, with care not to involve or injure branches of the facial nerve or the external maxillary artery.

3. Lyons, D. C.: D. Cosmos, 75:105 (Feb.) 1933.

Exposure of the jaw bone begins at a point corresponding to the center of the infected area as determined by roentgen-ray examination. Only that portion of the bone is exposed, plus a slight extension over healthy bone. On reaching the periosteum over the infected bone, one usually finds that it is raised and covers a considerable area of pus. An aspirator is placed upon the periosteum and it is carefully incised to allow the aspirator to take up the pus as it wells through. This prevents a spread of the infective material and keeps the operative field cleaner. The periosteum is then reflected, all of the necrotic bone being exposed. In this particular case, it was necessary to carry the reflection upward and backward over the entire ramus, which was involved.

The ramus and all of the anterior or outer portion of the mandible to the first bicuspid region was removed by rongeurs and curets. All diseased bone was removed, only healthy noninvolved bone remaining.

The mouth was then opened and all involved teeth were removed. The alveolar process was smoothed and the gum tissues were sutured tightly together so that there was no drainage into the mouth.

Fracture bands are usually placed on the upper and lower teeth, the Winter type being employed, and the jaws are tightly held together in a physiologic rest by small rubber bands (one quarter inch in length) instead of interdental wires. This method holds the jaws in a resting position with a minimum of strain.

In the case used here as an illustration, it was thought necessary to use some other method of ligation because of the extensive involvement of the ramus on the infected side.

Impressions were taken of the molars, bicuspids and cuspids on the healthy side and solid casts so constructed that the up-

per and lower could be held tightly together by means of a stainless steel pin. These were cemented to the teeth and the pin was slipped in place.

The operative area was then washed gently with a 1 per cent solution of colloidal iodine and loosely packed with sterilized vaselined gauze. None of the tissues were sutured together. The pack was then covered with a dry dressing.

POSTOPERATIVE TREATMENT

Oral cleanliness is maintained in these cases by frequent irrigation with an antiseptic solution, a 1:500 solution of acriflavine being preferred. The dressings are removed every forty-eight hours or at longer intervals, according to the amount of initial drainage. At the same time, the rubber bands or the pin is removed and the teeth are washed with a soapy tooth paste; after which the pin is replaced or new bands are inserted as the case may be. The action of the saliva on the rubber bands is such that they must be replaced at least every four days to maintain their average elasticity.

When the infective process diminishes and there is no more drainage, the skin tissues and fascia are loosened and sutured in place, only a fine linear scar that is hardly noticeable remaining.

In this particular case, healing and a complete cure were obtained in 105 days, or slightly more than three months. There were no postoperative complications and no further sequestra developed.

COMMENT

In the usual case, it is advisable to delay the operation until the white count is less than 12,000. In cases in which the infecting organism is a staphylococcus, this count is reached very early; but where the streptococcus is present, counts as high as 50,000 to 60,000 may persist for some time.

The treatment as outlined in this paper is essentially an application of biochemistry and the usual principles of the surgical treatment of osteomyelitis of the long bones to treatment of the jaw. This is especially true from the standpoint of rest, open relief and vaseline packing. This method has many advantages as to accessibility to the diseased area, prevention of toxic acid concentration and prevention of reinfection from the mouth, a complicating factor in most cases of osteomyelitis. Rest of the jaws prevents extension of the infection by muscular compression and jaw movement.

All these total one result, the advantage of this method because time of convalescence and duration of the disease are shortened. It is believed that removal of the diseased bone at this early stage of the disease prevents many cases of pathologic fracture, the resting of the jaw bones also preventing this complication by eliminating masticatory strains, and continued extension of the infection and sequestration being checked.

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Editorials

LABORATORY FINDINGS OR CLINICAL EXPERIENCE

It is needless to contend that one method of investigation, laboratory findings or clinical experience, shall be followed to the exclusion of the other in running down the cause or causes of dental disease. Unquestionably, both methods are needed, but it remains for us to consider somewhat carefully which method offers the greater promise of ultimate success, the laboratory or the clinic.

If we were compelled to cast a vote one way or the other and let it go at that, we would unhesitatingly pin our faith to clinical experience. Of course, there are certain problems that cannot well be solved in the mouth with living sensitive tissues. There are chemical reactions that are supposed to be significant and more or less associated with disease processes that cannot be demonstrated on the living subject; all of which would naturally be supposed to present a barrier against the solution of many of our daily manifestations through the clinic method, but if we cannot trust clinical evidence, we cannot trust anything.

And, in all conscience, there have been enough theories promulgated on the basis of laboratory investigation that have proved almost utterly worthless to justify us in a large element of skepticism when it comes to relying on the laboratory method alone. This does not indicate that we should discard laboratory investigation (we need more laboratories instead of fewer), but when we see a scientist concentrating solely on the test-tube and litmus paper in a smaller laboratory, and apparently forgetting that there is a living, breathing human being at the end of every one of our problems, we begin to wonder if we have not seized the wrong strings and are blindly pulling away on a piece of inert machinery in a futile effort to make productive and significant wheels go round.

Hundreds of thousands of dollars have been spent in the research laboratories of the land on abstract problems without any apparent effort to tie these problems up with clinical experience, but now there is a growing tendency to combine the experimental with the practical, and we look for more concrete results.

This business of research is a terribly complicated affair. Nowhere in the realm of human endeavor is there ever presented for solution a more difficult problem than that involved in a study of the cause and cure of certain of our human diseases. In some respects, our research workers have accomplished wonders and are worthy of all commendation; in others, we must still hang our heads in humiliation and defeat. Cite dental caries for example. After all, it is a dismal story.

If we study statistics, we are confronted with some very disheartening facts. We find susceptibility still most manifest and decay rampant. And in every individual and every group where we have succeeded in checking dental decay, it has come about almost wholly through clinical care and not through laboratory investigation. Clinical experience has taught us nearly all we know or can prove about the cure of dental caries.

The dental profession has waged a valiant fight to suppress dental caries, and wherever dentists can secure the cooperation of the people, they can come pretty nearly promising that they can keep this disease under control, but, in doing so, they must follow

other methods than that of laboratory experimentation. Let laboratory work go on by all means to shed what light it may on the pressing problems of the hour, but let us pin our chief faith to the experience that comes to us through actual contact with the daily manifestations that we encounter in the mouth.

It is only through this means that we have been able to deliver concrete service to the people, and accomplish the good we have; and it is only this that will bring us further knowledge and equip us to more abundantly serve a much afflicted humanity.

DENTISTRY FOR CHILDREN—WHAT DOES IT MEAN?

What does dentistry for children mean? What may it not mean? Not till the slogan "Dentistry for Children" is heralded from one end of the land to the other, in fact is heralded wherever dentistry is known, shall our members be absolved of the responsibility that is inherently theirs to face this question of the crying need of properly caring for the teeth of children.

Dentistry never gained a glimpse of its possibilities till the time came when men and women of vision began to go back to the fundamentals and look for defects in the teeth of growing children. It apparently took so long for the profession to realize the true significance of preventive dentistry as represented by the care of children, and even now there are many in the profession (sometimes it would seem as if they were in the majority) who persistently ignore their obligation in the matter.

All honor to the pioneers who first forced recognition of the fact that to properly combat dental disease was to begin at the beginning, which meant definitely that the moment teeth came in the mouth of a child, they should be subjected to the most conscientious scrutiny, and receive the benefit of the most solicitous care.

No matter what the degree of susceptibility may be in the mouth of a child, it is a matter of common knowledge—rather, we might say, of uncommon knowledge—that the very large majority of mouths may be changed from a condition of susceptibility to a condition of immunity by procedures that any dentist can follow out, provided he applies himself conscientiously to the task and has the cooperation of the patient.

Again and again, we have called attention to the significance of the manifestations of susceptibility and immunity in the study of dental decay, and this holds with especial emphasis in the case of children. In almost every mouth where the evidence of susceptibility has been made manifest, the observant operator may see the signs if he only looks for them, and in the case of a child, those signs are of the utmost significance.

One of the chief requisites in the establishment of immunity is the maintenance of proper function. No child need be expected to develop immunity when the organs of mastication are so impaired that the comminution of food is impossible. If we examine the teeth of any child and find evidence of unmistakable immunity, we shall find that the masticating equipment is such that the child is reasonably well able to masticate food.

Sometimes, the problem of maintaining comfortable mastication is not an easy one. The agencies of evil enter in with persistent force and, in certain instances, the demon of decay assails the teeth in a most discouraging manner and threatens to wreck the entire mouth. But no matter how discouraging the situation may be, the practitioner of conscience will not give up the fight as long as the patient signifies a willingness to cooperate. The marvels that have been accomplished by some of those who are specializing in child dentistry should prove an encouraging chapter in the history of this work. Mouths have been redeemed from what would at first blush seem an utterly hopeless state of disintegration and destruction, and restored to a condition of health and serviceability. The possibilities of children's dentistry are more and more being made manifest, and thus there is the insistent demand for a greater number of organizations devoted wholly to this specialty.

Every bit of effort devoted to the care of children will result in a future harvest that shall ensure to the people a better dental equipment and a lessened toll of dental disease.

THE PSYCHOLOGY OF WEARING ARTIFICIAL DENTURES

Yes, there is a psychology wrapped up in the successful wearing of artificial dentures. Otherwise, we would not be presented

with the prevalent incongruity of witnessing two intelligent persons reacting so diametrically differently in their attempts to wear dentures.

One of them (the exception) will nonchalantly toss a denture in the mouth and begin munching anything from caviar to cookies as "to the manner born," while the other (the rule) will clamp down the lips and look with grim refusal on any attempt to utter a syllable the moment any appliance is placed in the mouth. And the same dentist with the same skill has probably made both appliances.

Why is this? There is no reason except a temperamental or psychologic one, and some day a full denture man or some other man is going to prepare a paper on the psychology of wearing artificial dentures, and analyze the various reactions that assail the person who is condemned to accommodate himself to something other than the natural organs.

What a blessing artificial dentures have been! With all of their limitations, they have supplied a want in human affairs that cannot be ignored. The loss of the natural teeth leaves the unfortunate victim so helpless, so bereft, that willy-nilly something must be done to remedy the calamity. The construction of artificial dentures has been carried to such a point of perfection that a service which a few short years ago would have been considered impossible has been given, yet, in spite of all of this, there are numberless cases wherein, with all of the skill of the prosthodontist, certain hapless persons experience a very sorry time of it when they try to wear artificial teeth.

A crumb of comfort may be given these unfortunates, albeit a rather meager crumb, in the assurance that while some of them may appear hopeless, there is no such thing as utter hopelessness in wearing dentures. Usually, in the fullness of time, the punished tissues begin to yield to the bridle and accommodate themselves to the new conditions and accept the inevitable. When this state is reached, the worst of the battle is over, though of course there are certain contingencies that may arise all along the line that require not only the best skill of the denture man, but also the greatest cooperation and forbearance of the patient.

After all, the temperamental reaction of the patient is one of the chief agencies in the comfortable or uncomfortable wearing of artificial dentures. Sometimes, a greal deal can be done with a patient in advance by a frank and sympathetic discussion of the problem between patient and practitioner. The handicaps of wearing dentures should never be minimized to a prospective patient, as otherwise much heartache is liable to result when the dentures are placed in the mouth for the first time.

At best, the wearing of artificial teeth is an adventure to most persons, and this fact must be recognized in any constructive consideration of the question. Patience and long suffering may as well be recognized as part and parcel of the program for most patients when they attempt to "break in" a new set of artificial dentures.

PRACTICE IN PARAGRAPHS

This department is intended for busy readers. It aims to tell a vivid story in a few words. Items should be of a practical character, and free from padding—not more than a paragraph or two. We exact no limit, but two hundred words can tell most of these stories. Send in your ideas; they will be welcome.

Cleaning Handpieces—Clean and oil handpieces at the close of every day. It pays dividends.—*C. C. Norris, Oshkosh, Wis.*

Statements—Mail your statements before the first day of the month. Sometimes, first in, first paid.—*C. C. Norris, Oshkosh, Wis.*

Silicate Under Gum Margin—To get silicate cement under the free margin of the gum, cut the matrix material to conform to the contour of the gum, and reinforce with modeling compound.—*C. C. Norris, Oshkosh, Wis.*

Hesitating Burs—If one shaving kills a keen edge razor blade, a bur used only once certainly loses its keenness. The loss of bur edge is more apparent in removing an old amalgam filling when four or five old burs often precede the sharp one. Using a new bur once only enables the busy dentist to burnish less and cut faster. Burs that hesitate are lost and belong with other logical discards.—*Herbert Ely Williams, Red Bank, N. J.*

Hand Age Vs. Machine Age—Only small to medium gold foil fillings are practical for hand or automatic mallets whose condensing blow ratio is only 1 to 25 as compared with speedy engine or electric mallets. Fillings of inlay size, to be profitably made, demand engine straight mallets and electric right angle mallets in connection with hand or automatic malleting. Radio City, riveted by hand, would still be far from finished.—*Herbert Ely Williams, Red Bank, N. J.*

Elastic Impression Material—A good formula for an elastic impression material (reversible hydrocolloid) is the following: agar flakes, washed in several changes of cold water, almost enough to fill the mixing syringe when wet; fine kaolin or clay, about 10 gm., according to individual preference, to give body or strength to the agar jelly; solution of mercurochrome, about 2 c.c., to act as a preservative and coloring agent.—*Alfred T. King, 55 E. Washington St., Chicago, Ill.*

Rubber Fulcrum Ball for Use with Forceps in Extracting Lower Molars—A rather soft rubber ball about seven-eighths inch in diameter, such as boys use in playing jacks, is a wonderful assistance in extracting many lower molars. It is especially useful in lifting them out after they have been loosened but still resist removal. Apply the forceps as usual and then crowd the ball back against the beaks as far as it will go. Use a downward pressure on the handles of the forceps while using the usual manipulative movements. The tooth is eased out with no tendency to come away with a bang. A string through the ball provides a safety measure that might some time save embarrassment.—*F. W. Van Voorhis, Citizens National Bank Bldg., Claremont, Calif.*

Preoperative Care—Preoperative care embraces general and local treatment. Before either of these is considered, one general rule must be emphasized: Not for a moment should the operator forget that the patient is a human being, subject to fear and nerves, and it is therefore of the utmost necessity to be sympathetic, gentle and kind. An assurance by the operator in a soft and quiet voice will go a long way toward putting the patient in a tranquil mood. After this first and most important aid has been proffered, the operator's attention may be directed toward the local preparation of the patient. In some instances, the patient may still be highly nervous and excitable and may require further general preparation. In this connection, the administration of the following sedatives has proved of value: bromural, camphorated validol and the bromides. These drugs are most useful in quieting the patient and thus serve to allay or diminish fear and apprehension regarding the operation.—*James L. Zemsky, 147 Fourth Ave., New York City.*

Care in Making Distal Incision of Flap for Removal of Impacted Lower Third Molar—Palpate the superior border of the body of the mandible. Start the incision at the ascending portion of the ramus, if necessary to extend that far, and cut toward the distal surface of the second molar. Be sure to stay within this area as there is the possibility of severing the lingual nerve if the distal incision is carried too far medially. Remember that the ascending portion of the ramus deflects laterally from the body and that the incision should not be carried too far distally parallel with the molar teeth. It is rarely necessary to incise medially of this area. If the occasion ever presents itself, make the incision parallel and close to the medial surface of the body of the mandible. Cut through the mucous membrane and, by blunt dissection, expose the bone and retract the tissues of the floor of the mouth, which will have the lingual nerve in it. Never cut down on the medial surface to and at right angles to the bone as this may sever this nerve. Dorrance has mentioned cases wherein permanent anesthesia of the side of the tongue and the mucous membrane of the side wall and floor of the mouth on that side had resulted from this careless procedure.—*Julius Caplan, 4802 Broadway, Chicago, Ill.*

COUNCIL ON DENTAL THERAPEUTICS

ACCEPTED DENTAL REMEDIES

The following article has been accepted as conforming to the rules of the Council on Dental Therapeutics of the American Dental Association. The Council wishes dentists to understand that the admission of an article does not imply a recommendation. A copy of the rules that govern the Council in the consideration of articles will be sent on request.

SAMUEL M. GORDON, *Secretary*

DENTIFRICES*

Zanol Tooth Powder.—Composition: Each 100 gm. is stated to contain precipitated chalk, U.S.P. (Snow Top Calcium Carbonate Precipitated Extra Heavy and Super Light, (J.A.D.A., 23:490 [March] 1936), 91.9 gm.; soap, 5 gm.; methyl salicylate, U.S.P., 3 gm.; saccharin, U.S.P., 0.1 gm.

ABRASIVENESS: Loss determined on an instrument of the brush type on coin silver for 6,500 double strokes of 2 inch length with a brush (1½ inches by ½ inch) under 285 gm. at 50 double strokes per minute, is 0.0127 gm.

Manufactured by the American Products Co., Cincinnati, Ohio. No U. S. patent. Trademark No. 81,313 (March 21, 1911).

*A.D.R. 1935, p. 91.

COMPARATIVE PHARMACOLOGIC AND TOXICOLOGIC ACTION OF CHLOROBUTANOL (CHLORETONE) AND BARBITAL SODIUM

Chlorobutanol is listed in the United States Pharmacopeia XI. It was not listed in the United States Pharmacopeia X. At the time of the compilation of available drugs useful in dentistry, the Council considered a brand of chlorobutanol for admission to Accepted Dental Remedies. In the course of discussion, one member of the Council who has had extensive experience with the use of chlorobutanol stated that this drug was more toxic than barbital sodium on oral administration. These objections were submitted to the firm marketing the drug under a protected name. The firm objected to this statement, but sent no evidence to support its objections; whereupon, the member of the Council in charge of the investigation of this product undertook to compare the pharmacologic and toxicologic actions of chlorobutanol and barbital sodium. A study of several texts used by dentists indicates that chlorobutanol is being suggested as a sedative agent for the relief of postoperative pain. The Council has adopted the report that follows. It is presented for the information of the dental profession.

SAMUEL M. GORDON, *Secretary*

Years ago, the referee used chlorobutanol often as an anesthetic agent on dogs in the course of experimentation on various physiologic problems. The introduction of barbital (diethyl barbituric acid) for the same purpose seemed a decided advance, not only because of greater simplicity in the administration of the drug, but also because the subsequent anesthesia occurred with a more satisfactory state of the blood pressure and the respiration. The statements to the Council on Dental Therapeutics that the pharmacologic and toxicologic actions of this drug were of the same kind qualitatively and quantitatively

seemed erroneous on the basis of *impressions* obtained over years of personal experience with this drug. It seemed desirable, then, to collect *accurate data* on the comparative action of these two agents when used on dogs to which different dosages of the respective drugs were administered on the basis of fractions of a gram per kilogram of body weight.

Two methods of experimentation were employed. In the acute experiments, twenty dogs were used. On a given day of experimentation, two dogs of approximately the same weight and size were anesthetized with chlorobutanol and barbital sodium, respectively, the drugs being either administered *per os* or injected intraperitoneally. The dosages varied between 250 and 400 mg. per kilogram of body weight. The respiratory rate was measured by means of a pneumograph-tambour. Direct records of the carotid blood pressure and heart rate were obtained in the usual way by means of a mercury manometer. The animals were given their respective drugs within five minutes of each other; and were prepared for a record of the heart rate, blood pressure and respiratory rate as soon as anesthetized. Since chlorobutanol is freely soluble in alcohol, whereas barbital sodium is not, an equal amount of alcohol was given each dog and by the same route (either by intravenous injection or intraperitoneally). In each instance, hourly records of sufficient length were taken for the first four hours to measure blood pressure and to compute the heart and respiratory rate. Thereafter, the dogs were given intravenous injections every half hour of an equivalent amount of chlorobutanol and barbital sodium per kilogram, respectively. After the death of one dog, the surviving dog was given an injection every half hour of an arbitrary amount of a drug, ranging from 0.25 to 0.74 gm., until the amount proved fatal.

In the chronic experiments, eight dogs (two dogs to a set) were used. On a given day of experimentation, two dogs of as nearly equal weight and size as could be obtained were given chlorobutanol and barbital sodium by a stomach tube. The dosages ranged from 200 to 300 mg. per kilogram of body weight. As soon as they became limp, the animals were placed on a table and covered with blankets. The heart and respiratory rates were recorded at various intervals until the dogs regained consciousness and, in every respect, appeared normal.

RESULTS

In this preliminary report, only grand averages are given:

A. Acute Experiments.—1. Blood pressure: In the barbitalized dogs, the carotid blood pressure at the beginning of the experiments was 168 mm. of mercury. This pressure fell gradually during the ensuing three hours. The first three intravenous injections of barbital sodium had little effect on the blood pressure. Thereafter, each injection caused a marked fall in blood pressure, followed by a recovery, which was more or less complete prior to the next injection, one-half hour later.

After anesthetization with chlorobutanol in a dosage equivalent per kilogram of body weight, the initial blood pressure was on the average only 80 mm. of mercury. It remained thus for the succeeding three hours, after which it began to rise. Each intravenous injection of chlorobutanol caused a marked fall in blood pressure, with slow recovery. Herewith is an abbreviated report of the data for the first four hours of anesthesia. (Table 1.)

TABLE 1.—COMPARATIVE BLOOD PRESSURES

	After Anesthetization	One Hour Later	Two Hours Later	Three Hours Later	Four Hours Later
Barbital sodium	168.0 mm. of Hg.	140.2	130.5	123.7	133.3
Chlorobutanol	80.2 mm. of Hg.	83.6	79.0	78.6	97.0
Advantage of barbital in milligrams of Hg.	87.8	56.6	51.5	45.1	36.3

2. Heart rate: The dog given barbital showed invariably a higher heart rate than that of the animal given chlorobutanol, during nearly all of the experiments. Injections of both chlorobutanol and barbital sodium effected slowing.

With no attempt to evaluate the advantages of a more rapid heart rate, the data are recorded as obtained. The data here given represent the grand averages obtained from an analysis of all experiments. (Table 2.)

TABLE 2.—COMPARATIVE HEART RATES PER MINUTE

	After Anesthetization	First Hour After	Second Hour After	Third Hour After	Fourth Hour After
Barbital sodium	178.0	142.2	181.2	180.6	193.5
Chlorobutanol	116.6	119.2	122.8	136.5	156.0
Increased rate of heart of dog given barbital	61.4	23.0	58.4	44.1	37.5

3. Respiratory rate: The respiratory rate of the dog given chlorobutanol was in each instance higher than that of the dog given barbital. We suspect that the increased rate bears a direct relation to the lowered blood pressure in these animals. If this interpretation is correct, the increased respiratory rate expresses a medullary asphyxia. Respiration was irregular in both cases and was affected by each intravenous injection in the direction of slowing.

An abbreviated protocol (grand average) of the results obtained is given in Table 3.

TABLE 3.—COMPARATIVE RESPIRATORY RATES FOR FIRST FOUR HOURS

	After Anesthetization	One Hour Later	Two Hours Later	Three Hours Later	Four Hours Later
Chlorobutanol	43.7 per minute	50.2	43.0	44.6	79.3
Barbital sodium	20.4 per minute	29.6	40.7	30.3	31.8
Greater rate of dogs given chlorobutanol	23.3 per minute	20.6	2.3	14.3	47.5

It will be recalled that after the heart rate, blood pressure and respiration rate were observed for four hours after the induction of anesthesia, each animal received equivalent doses of chlorobutanol and barbital sodium, respectively, on the basis of body weight.

The data revealed that the total amount of chlorobutanol necessary to cause death (including the original anesthetizing dose) amounted to 428.97 mg. per kilogram in the case of chlorobutanol; whereas, 620.67 mg. per kilogram of barbital sodium was required to kill the animal. These figures show that chlorobutanol is approximately one and four-tenths times as toxic as barbital sodium.

B. Chronic Experiments.—As was the case in the acute experiments, the heart rate of the dog given barbital was higher; whereas, the respiratory rate of the dog given chlorobutanol was decidedly higher.

In this series of experiments, the referee was primarily interested in the rate of recovery of the animals to the point where they deported themselves normally after their enforced sleep.

Results: A given dose of barbital (which was varied) caused an anesthesia averaging from thirty-six to forty-eight hours. A similar dose of chlorobutanol (in milligrams per kilograms) caused an anesthesia from which the dogs often did not recover in the course

of the ensuing week. The dogs given chlorobutanol usually walked sooner than the dogs given barbital, but they staggered around aimlessly and seemed to be oblivious of their surroundings. They often walked in circles until fatigued. They were, furthermore, dull, depressed and apathetic for nearly a week after anesthetization. The dogs given barbital usually recovered quickly and completely within forty-eight hours. The dogs given chlorobutanol recovered more slowly. Very often, the animals became unconscious again after a partial recovery.

CONCLUSIONS

On the basis of these results, the referee concludes that barbital sodium is by far the safer hypnotic for human beings and the safer anesthetic for the dog. Chlorobutanol (chloretone) may, and undoubtedly does, have superior properties as an antiseptic or as a preservative for such biologic products as epinephrine (adrenalin) and solution of posterior pituitary. When a hypnotic is indicated in the practice of medicine or dentistry, barbital sodium is more desirable than chlorobutanol because of its greater factor of safety. Chlorobutanol (chloretone) is not recommended to the dental profession as a sedative or hypnotic in preference to, or on equal terms, with barbital sodium (veronal). Its use as a preservative, or as a local anesthetic for topical use, is not disputed. (The use of chlorobutanol in alcohol as a topical anesthetic is discussed in "The Practical Value and Limitations of Topical Anesthesia in Oral Surgery," [J.A.D.A., 23:309 (Feb.) 1936].) The referee desires to point out that the promulgators or proponents of employment of chlorobutanol erred in their statement that it can be prescribed (for internal use) as safely as can barbital sodium.

Lincoln Golf Links, overlooking the Golden Gate. The United States Naval fleet is seen coming through the Gate.

BUREAU OF PUBLIC RELATIONS

EIGHTEEN YEARS OF MOUTH HEALTH TEACHING*

By G. M. COOPER,† M.D., Raleigh, N. C.

I HAVE been asked to describe the beginning of mouth health teaching as it has been carried out in North Carolina by the state board of health for the past eighteen years.

There were a number of reasons for my own interest in the subject. Among them may be enumerated personal suffering, a typical English family tendency to decay of the teeth, association in high school, in college and in the first years of practice with dentists of personal integrity and of great professional ability and, in addition, the observation that I made in the early years of practice as a physician of the disastrous effect on so many people of neglect of the teeth. I take some of my philosophy from Marcus Aurelius, laid down in the days when Rome was mistress of the world. For instance this:

> A man who leads a life of tranquility and reflection, who is not disturbed at home and meddles not with the affairs of the world, may keep his mind at ease and his thoughts in one even course. But such a man has not been tried. All his ethical philosophy and his passive virtue might turn out to be idle words if he were once exposed to the rude realities of human existence. Fine thoughts and moral dissertations from men who have not worked and suffered may be read, but they will be forgotten. No religion, no ethical philosophy is worth anything if the teacher has not lived the "life of an apostle," and been ready to die "the death of a martyr."

The personal disadvantages and adverse effect of dental decay on my own health, to say nothing of the suffering spread out over the years, served to imbue me with a zeal for this cause that I could have had developed in no other way.

Eighteen years ago last March, after several years of insistence on the part of the state board of health and of much research work, the Legislature of North Carolina enacted a medical inspection of schools law. I was then state director of the bureau having that work in charge. The governor of the state was interested and pushed the measure through the legislature. It carried a small appropriation that was hedged about with a good many restrictions, but it did suffice for considerable experimental work.

From 1915 to 1917, under my direction, three physicians were employed for medical inspection of schools in selected counties. During the two years, these three physicians examined about 20,000 children living in twelve counties in as many different sections of the state. This work established two facts: (1) that not less than 80 per cent of the children enrolled in the schools had decayed teeth needing immediate dental attention, and

*Read before the Section on Children's Dentistry and Oral Hygiene at the Seventy-Seventh Annual Session of the American Dental Association, New Orleans, La., Nov. 5, 1935.

†Assistant State Health Officer.

that less than 5 per cent of such children had never visited a dental office or come in contact with a dentist in any way; and (2) that there was a need for organized effort to direct attention to this fact and to organize the physicians and the dentists of the state in such a way as to provide a remedy for the situation.

Early in 1922, after five years' efforts under the first law, which was amended and strengthened in 1919, an appropriation was made outright and increased to $50,000 a year. I published the following statement in the *Health Bulletin* for April, 1922:

> The most perplexing, the most discouraging, and to the director of this work the most unnecessary and heartbreaking condition—it is no theory—confronting us at every turn is the wide, fixed, and almost impassable gulf existing between the thousands of helpless children needing their services on the one hand and the physicians, surgeons, specialists, and dentists on the other.

In those days, many dentists had time on their hands, were not busy more than half the time—competent, well-equipped dentists. On the other hand, there was this large group of eight of every ten children in the public schools needing the services of these dentists. The ethical dentist could not go out on the streets then any more than he can now and invite these people to come into his office for the treatment that he knew they needed and that he could provide.

It was my conception then, and it is confirmed now, that the state board of health, and, through it, the local health department, could assume leadership in this one field; that is, it could be the medium for getting the parents of children lacking dental care so impressed with the need for this treatment that they could be induced to visit the dentist of their choice. On the other hand, the health department could interest the dentist in cooperating with the department in making it easy for these children to become patients. In other words, the health department could, and should, bring the two together for the benefit to everyone concerned.

We had experimented in the medical field by selecting part-time physicians, paid for part-time service, to make inspections in the schools and to send the parents recommendations for treatment. This was unsatisfactory because, in the first place, all physicians practicing could not be employed and some of them could not be interested. Those who did get out and undertake the work were handicapped by the demands of their private practice; which made their work irregular. They suffered criticism from some of their fellows, who accused them of advertising themselves; and, in many other ways, the situation was unsatisfactory.

The dentists of North Carolina, about twenty years before the inauguration of this effort of ours, had themselves undertaken to do some work. They had divided some of the sections among themselves. They had, with the cooperation of the superintendent of schools, gone into the school houses and made the examinations, and a record had been sent to the parents with treatment suggested. Disaster had met this enterprise. The dentists were unjustly accused of advertising themselves and soliciting practice. In a number of instances, notices had been sent when one dentist had examined the child who happened to be a patient of another, and it was natural that the treatment advised was not always the same, and so on.

The dentists of this older day had become discouraged and dropped the whole matter, and they could not be blamed for so doing. As I devised the plan step by

step which we thought it would be safe and advisable to inaugurate, I took counsel from time to time with some of the ablest dentists in the state, men of ability and public spirit. The chief credit in the success of the undertaking should go to the officials of the state dental society, especially the executive committee and the state dental examining board; and, of course, the young dentists who went out to do the work made success possible. They were honest, industrious and capable.

I took full responsibility, as the board of health was not at all sure that we might not meet with disaster, and I agreed to resign if the plan failed. I went on the principle, which is fundamental to the public school system, that we would confine our efforts to public school children, particularly in the beginning; and that the state had a duty and responsibility for the physical condition of these children, just as much as toward their mental development. I went also on the principle that the dentist should be paid for his whole time, and that whatever treatment was undertaken must be of the simplest type, and must be done for all classes of children if all classes of parents were to be reached. We have found it to be a fact that poverty is not always the cause of dental neglect. I went also on the principle that the greatest teaching in the world is that which is carried on by example. In other words, our idea was to let the children learn of the dentist by going to see him. We have never allowed any child or parent to pay a fee for this service. I have found from experience that any tampering with professional fees is productive of much harm.

When I published my first report, in a special bulletin of sixty-four pages, late in 1921, entitled "Five Years of Medical Inspection of School Children in North Carolina," which was later published in April, 1922, as the regular monthly volume of the health bulletin of the state board of health, I was able to record that up to that time, 66,452 children had been given free dental treatment by dentists employed solely by the state board of health. A dentist paid by our board and representing our department had, up to that time, visited every schoolhouse, both white and colored, in the State of North Carolina, and had done work for school children and given a lecture to every child enrolled in the public schools of the state.

We called our first effort a "dental clinic," for want of a better term. We emphasized from the beginning that whatever treatment was offered was simply as an example. It was dental education brought down to the level where the most ignorant parent and child could understand what we were talking about. In the beginning of the work, I found that there was no precedent in this country for us to follow. Nowhere could we turn for aid in developing our plans. We simply had to go ahead and pioneer. In that early day, I used the following statement to explain our position:

> The child treated is an example to all the people who know him and see him that the treatment is good. One living, moving example will carry more weight than six miles of literature and six years of talk by all the health officers and physicians and dentists in Christendom. . . .
>
> After demonstrating practical methods, teaching, educating by example, how to prevent the common physical defects of children, and how to treat them when it is impossible to prevent, the responsibility of the State Board of Health in this field will automatically pass to the general public and to the professions most concerned, and on whose shoulders the work must depend for

permanency—that is, the medical and dental professions. . . .

Time alone, ten to twenty years at least, can serve to emphasize the marked effect on the health, happiness, and physical well being of every class resulting from the inauguration of this work.

I have the immense satisfaction of being able to live until the present time and to see the widespread interest in every section of our state in this field. I get the same reports today from employes of my department who are still at work inspecting school children with the aid of the blanks that I devised nearly twenty years ago. The same questions are asked and the same answers are demanded. A comparison of their reports today with some of the reports of the workers who have been in my department all the time, sent in sixteen and eighteen years ago, afford me supreme satisfaction. I now receive every week their reports of the inspection of 3,000 or more children. In response to the old question: "How many children found in need of dental treatment?" the classic answer has fallen from 80 per cent to about 50 per cent today. "The proof of the pudding is in the eating," and the fact that the prevalence of dental decay among the school children in North Carolina has fallen by nearly half in the last eighteen years is all the proof that I want that the work has been successful.

I directed this work from its conception for the first eight years of its activity. I kept in close touch with it in an advisory capacity, for the following four years; but, for the last six years, Dr. Branch has been in command of the enterprise, and as an educator, a demonstrator, a teacher, by precept and example, he has no equal. He has greatly increased and enlarged the force that work in this field. The work, begun so humbly eighteen years ago, is coming to full flower under his direction.

The fundamental plans remain the same. To repeat, the treatment given is for the purpose of illustration and example, to demonstrate to the people what can be done and what should be done. As a result, the people of North Carolina are awake to the desirability of good teeth, of perfect mouth health, and they are becoming more willing to pay for it. According to my observation, the dental profession in North Carolina today is more prosperous and active than it has ever been.

One of the great satisfactions that I have had in inaugurating this work is the knowledge that I have contributed toward the elevation of the dental profession as a whole. When I undertook this work, there was no dentist member of the state board of health. They had tried for twenty years to get legislation placing a dentist on the board, but had failed every time. Before this work had been going on two years, we were able to induce the governor to appoint a dentist as a member of the board. A dentist has occupied an important place ever since as a board member, the present vice president of the board being a dentist. One of the most prized letters that I ever received from any man was from a high official of the United States Government sometime ago, in which he wrote:

I am glad to hear that you are going to meet with the national dental association. One of your greatest satisfactions should be that you have promoted the dignity and welfare of the whole dental profession in North Carolina. Before you began your crusade, the average dentist in North Carolina was looked upon simply as a vocational artisan, but today he is regarded as a professional man of the highest standing.

We do not say that ours is the only plan that is workable or desirable. We do not say that it is a better plan than anybody else has. We do assert that it has stood the test of eighteen years' ap-

plication, that the activities have expanded and enlarged, that it has the respect and support of the dental profession, the medical profession and the public in general of North Carolina. We assert that the plan is workable, that it is practicable, that it can be applied anywhere, that much can be done, according to funds, or little can be done, and the net result, as far as it goes, will be the same in proportion to the amount spent. We have knowledge of many efforts that were tried and failed along various lines. The failures were obvious and were to have been expected. Many of the plans now proposed in other states have been tried by our people in various sections at various times and have failed to work. We do not feel like criticizing any other program in any other state. In the course of time, a better plan will be evolved than we have; and when a better plan is presented, we will immediately avail ourselves of its benefits.

There is just one caution that I leave with you: this work, as all public work, should be kept free from commercial interest of every kind.

BUILDING A PRACTICE AT SIXTY

By J. WALTON DACE, B.S., D.D.S., Winchester, Ill.

IT is not my purpose in writing this article to advance some new technic or to tell you how to practice dentistry, but rather to tell you how I get dental work to do. I wish at this time to present to you the manner in which I "sell" myself to the public and how I get patients into my office.

To those whose appointment books are filled and who do not care to take on any more technical or clerical work, my remarks will not appeal. To those who have a few idle hours and do not mind a little extra work, and to those who are willing to contribute a service to humanity and at the same time enrich themselves, both mentally and financially, what I have to say will be of interest.

We will assume that junior dentistry has a place in every man's practice, that no practice can continue to survive and grow unless new patients are constantly forthcoming and that the greatest field from which to secure new patients is that of children.

One morning a few years ago, I awoke with a depressed and sickening sensation. A feeling that all was lost, that there was nothing left worth while and I had just as well give up and quit. My exchequer was depleted and my business was largely gone. The stock crash of 1929 had taken my savings of a lifetime, which I had invested in good sound securities, and the depression had wrecked my business.

The blow dazed me for a short time, but I was not a quitter. Had I not surmounted obstacles and forged ahead in spite of things? I would not let this situation get me down. After looking the facts squarely in the face, I determined that "a new Rome should arise out of the ashes."

I am a dentist in a small town and have been in continuous practice in one location for more than thirty-five years.

I know everybody in my community and everybody knows me. I began looking about for a new way to begin. I wished to start from the bottom and build upon a new and secure foundation. I knew nothing but dentistry, and, although I was in a small town, I had the same opportunity for study and learning as did my professional brothers of the larger cities. I belonged to the same dental society, read the same dental journals and attended the same dental conventions.

The thing, I decided, that I must do was to give better service or a new kind of service or something that they could not get elsewhere. Just what this would be I did not know.

About this time I attended one of our big state dental conventions, and, while there, I stood at the booth of one of the large manufacturers of dental equipment and listened to the salesman exploit his wares. He was lecturing on children's dentistry or preventive dentistry, and showing how, with their equipment, we could attain that end. By the time I left the meeting, I was completely "sold" on junior dentistry and also on the junior equipment. This lecturer told of making a complete record of every child's teeth as he came into the office and, if possible, getting a picture of the child to place with the record.

Then I thought: Why not *take* a picture of every child and place it with the record? I had been reading a great deal of late about clinical photography and it appealed to me as one way of making a definite record that would be lasting. But I had never taken a picture in my life and never owned a kodak. However, the idea seemed good to me and, as soon as I got home, I purchased a kodak and went to work.

A friend of mine made me a neat little tripod of soft pine and I purchased some photo flood lights and proceeded to spoil a few films. Finally, I learned that by placing the patient a certain distance from the kodak and turning on the light and making a time exposure I could get a picture.

I began a system of organized effort. I wanted to find out why some children's teeth decayed and some did not. I began an investigation of the child's physical condition, its manner of living and its environment to see what effect these things have on the teeth.

This is the story I told the mothers: "I am making an investigation of the development of the teeth and jaws in children. In doing this, I get the exact age of the child and his height and weight, also the color of the eyes, the color of the hair, the grade he is in at school, what he eats for breakfast and the exercise he takes, and learn whether there has been any prolonged sickness. I then make a careful examination of the teeth of the child and record the findings on a chart and, last, I take a kodak picture of the child and put that with the record. I also make an extra picture for the child to keep. We call this class of little folks our 'Happiness Club,' for a child should be happy with a clean and healthy mouth, and each child receives a pin to show he is a member of the club. There is no fee or obligation for this service, and I should like to have your child as a member."

This always pleases the mother and the child both. The mother realizes the part that good teeth play in regard to the child's health and development and they both like the picture. When I have made a sufficient number of these examinations and have made charts and taken pictures, I divide the records into groups according to age and classify them. I take the best record from each class and compare the records to find out what relation one has to the other. What I

am trying to do is to find out how a child should live in order to have good teeth instead of bad ones. It is worth more to the child and the parent to keep the teeth good than to have them repaired after they decay.

I have made hundreds of these examinations in the last three years and have taken hundreds of pictures. I put these pictures in a scrapbook and keep the book on my reception room table. This has grown into a set of books that are looked over and enjoyed more than anything else in my office. The parents like to see their children's pictures in the books and the children drop in from school to look over them and talk about them.

A mother sat waiting in my reception room one day looking at one of the books that had her child's picture in it, and she looked up at me and said, "Doctor, what is going to become of this book if anything should happen to you?" You see, her child's picture was in that book and she didn't want anything to happen to it. Do you think that mother will allow her child to go elsewhere to have dental work done? She has actual, tangible evidence that I am interested in her child and this has formed a tie that will be lasting.

Again, a woman came into my office one day and said, "Doctor, do you take pictures?" I said yes, thinking, of course, that she wanted a full mouth roentgen-ray examination. "No," she said, "I want a picture of my little girl like the one you took for our neighbor of her daughter and she wants it put in your scrapbook." This pleased me almost as much as if she had wanted the films made. "Oh," I said, "she wants to join our Happiness Club and get a pin and a membership card." This membership card says: "I will brush my teeth twice a day and see my dentist twice a year."

Another mother came in and asked me how I was getting along with my research work. Her little girl had joined the club about a year before and I was making a record of her condition. This mother told me that the Happiness Club had done much to get her little daughter to brush her teeth and come back to the office. I have scores of these little patients coming to my office for regular examination, and they climb up in my chair with the full assurance that the visit is going to be a pleasant one, for no child ever gets hurt in my office.

One day as I passed two boys on the street corner I heard one say to the other after I passed by, "That's my dentist," in a very proud way.

I have one little girl 10 or 12 years old, living in an adjoining town, who has actually brought me a dozen good patients. I took her picture when I first started the work, and, of course, when she brings her little friends I always take their pictures. In nearly every instance, they have dental work done and often the mothers that come with them have their teeth put in order too. With me, the kodak is a practice builder.

Soon I will have the picture of nearly every child in town, and who can estimate the value of those books in ten or twenty years from now?

I keep the negatives filed and indexed so the picture can be reproduced at any time. Some of these children may be presidents or wives of great men some day and will want a picture of themselves in childhood. Again, a grieving mother will come into my office some day and want a picture of the child she has lost by death, and I shall be able to get it for her.

At first I intended working for the parents and older members of the family only, but the children have won such a place in my heart and are such true

and loyal friends that junior dentistry has become my hobby.

I explained all this to a business man one day as he sat in my chair. He had charge of a set of chain stores over two states, and as I told him of the research work I was doing, he said, "Yes, Doctor, and do you know what else you are doing? You are building for the future."

I had been in the habit for some time of getting the birthday dates of the children that came into my office and sending them a birthday card when the time came. This has proved such a delightful experience for me and seemed to please the children so much that it has become routine work in my office.

It is a pleasant remembrance of the child's visit to the office, and quite often it is the first mail the child has ever received. I have had mothers call me up on the phone and thank me for remembering the child on its birthday, and have also had children come to my office or meet me on the street and thank me for the birthday card. This is a personal contact that I think is invaluable. What a little thing it takes to please a child, and when you make friends with the child, you have made friends with the whole family.

In sending out birthday cards one day, I was reminded that I myself would have a birthday some time soon, and I thought why not have a birthday party and invite my little friends. And so I did.

I sent out cards to the members of my Happiness Club, ages 4 to 8, to come to my party June 21, at 3 o'clock, at the office.

When the day came, the office was soon packed. The halls and stairway were jammed and the guests overflowed down into the street. Then I announced that we would have to go to the theater, and we filled that. Here, we had moving pictures of an educational nature and a comic strip or two of Felix, the cat. Some of the children recited pieces, sang songs and did stunts.

And as I stood there in that sea of happy faces, I breathed the prayer of the poet who sang, "Backward, turn backward, O time in thy flight, make me a child again just for tonight." While this work was all started from a scientific standpoint, I am wondering if the sentimental side of it doesn't overshadow the scientific side, for science cannot create nor can money buy the love of a child.

After the program at the theater, we went down to the restaurant, where refreshments were served. My wife had prepared some birthday cakes and on one had placed three candles. One for the past, one for the present and one for the future. I lit the first candle for the past, in memory of the birthday parties that I had when I was a child. I lit the second for the present, in honor of the birthday party that day, which was the biggest and happiest birthday that I ever had, and I lit the third candle for the future. And as I stood there, I seemed to vision a great crowd of people with strong healthy bodies, active minds and bright eyes, and as I looked into their happy smiling faces, I saw beautiful white and shining teeth, and then I could see that they were members of my Happiness Club grown up, boys and girls who started while young to take care of their teeth and learn how to live.

As my wife cut the cake and the refreshments were passed, the children sang "Happy birthday to you." After the party, they all assembled in front of my office entrance and I took their picture.

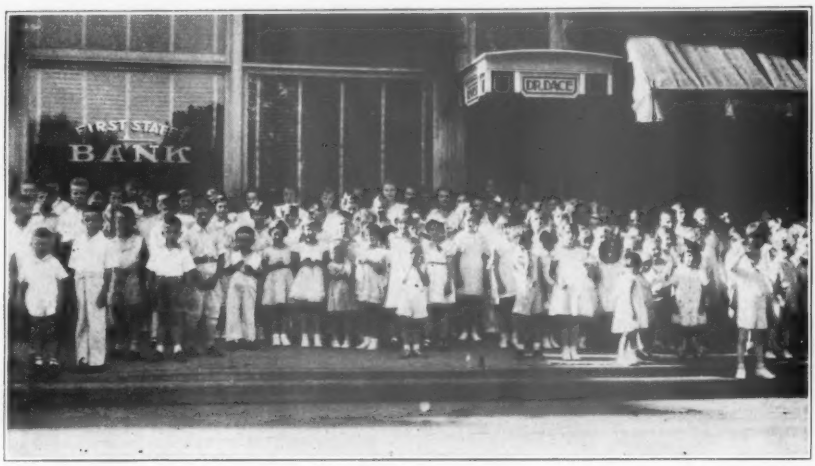
The average age of my patients is many times younger than it was five years ago, and their dental work is in-

creasing, while the older patients are dropping out or passing on to their reward. I, too, feel young again, for I have more friends among the children than any other man in town. I have taken a new lease on life. I am doing more real dental work and better dental work today than I ever did in my life before. Then I am building goodwill, the greatest asset that any business can have.

I have an ambition to practice dentistry twenty more years. My only regret is that I did not take up this work twenty years ago. What a valuable record I would have acquired by this time, and, at the same time, I would have seen a generation with cleaner and healthier mouths and better teeth.

I also have another book, which I have labeled "Personal." This book contains the pictures of the men about town that I come in contact with every day. It is my personal album and in no way connected with the research work that I am doing. It is a fad, pure and simple, which I enjoy immensely. When I show this book to one of the men and tell him that I want his picture in the book also, he seems to feel honored and pleased, for after all we are only grown up youngsters.

I think that I see myself in the distant future, when I have retired from active practice, and when the hand that held the drill for so many years is not so steady as it is now, turning the leaves of this book and looking at the faces of my old friends. I dream of the happy days when my day was full and my step was light, and my heart beats a little faster as I think of the friendships I have made. This book is something that money cannot buy.



Children at author's birthday party.

The more I see of this "depression" and the more I hear of vast fortunes being swept away, the more thankful I am that I am a dentist in a small town. I know of no business at which you can work longer and that is more conducive to a ripe and happy old age than dentistry.

DENTAL ECONOMICS

DON QUIXOTE*

By P. H. BELDING, D.D.S., Waucoma, Iowa

I NOW approach with trepidation, lest my motives be again misinterpreted, a question which should be decided upon the principles that regulate the lives of our fellow countrymen at this time, not those of yesterday; and yet not losing sight of the fact that careful meditation may bring a more sane and desirable tomorrow.

Now is an excellent time for analytical thought. Painful as that thought may be, it is inevitable, and procrastination will only add to the ordeal. To facilitate this analysis, it is essential that we cast off the shackles of subterfuge and self-satisfaction and revert to the irrevocable law of self-preservation and survival. We are faced with two mighty problems: First and foremost, we must find out how wealth is produced, exchanged, distributed and consumed. After acquiring that knowledge, we must consider how far we should allow the society philosophers, moralists and politicians to go in subordinating natural economic laws to the so-called higher considerations.

A student in social problems must be able to divorce fact from fancy. Basic economic laws are harsh and cruel; yet, over a period of years, their functioning is inevitable. It has always been the desire and endeavor of Christianity to stop the functioning of these laws. Practicability must determine how far the moralists are to be allowed to go in interfering with the functioning of natural law. In a profit system of economy, only that which is economically sound can for long successfully withstand the ravages of such an environment.

There is no one perhaps who believes more in the elevation of our professional standards than we do. Such advancement, if not based on sound economic principles, is bound to result in havoc and disaster. A study of the universities' more immediate history casts a very illuminating light on the subject.

Shortly after the initiation of the four-year dental course, let us say beginning in 1922, there were 13,099 matriculates in dental colleges. Following this period, there has been a progressive and very alarming decline. In the year 1932, the number of matriculates had diminished to 7,160. During this same period, there had been a decided increase in the number of matriculates in other professional colleges. These facts are decidedly significant and, if correctly interpreted, should prove a guide to future movements of our professional leaders.

We believe in increased requirements for the profession, but it is economic insanity to follow such a course unless there is to be a proportionate legal and economic increase in the rights, privileges and prerogatives of our profession. We are not totally blind to what the future may bring; in fact, we have visions both pleasing and otherwise. I be-

*Read before the Fayette County Dental Study Group, Nov. 21, 1935.

lieve that if continued along present obsolete economic lines (this takes into consideration the new requirements and the insufficient preparation that has been made for the change), professional dental service will be for the very few, and the profession will be constantly faced with the so-called inevitable adoption of some scheme of socialized service.

This condition does not present a very pleasing picture. The vision that we love to gaze on is of an entirely new profession based upon our present inadequate healing art. That is, we see a true doctor of preventive medicine whose scope of surgery is limited to oral conditions; who is a part and yet not a part of medicine; whose identity is always distinct; a profession whose success shall be based entirely upon the health of humanity rather than its ills.

In a paper of this nature, though desirable, it is impracticable to go into a discussion of basic economic principles. These have been excellently covered by both Ely and Walker. Thus, with one mighty leap, we span the gap from the primitive to the modern and find ourselves in a world whose very life's blood is commerce. The skies, the seas, the most impenetrable forests, mountains and deserts have all been subjugated by man in his ceaseless search for commerce. The ocean depths have been brought into submission; while countless augers bore deeply that secrets and riches may be extracted from the bowels of the earth.

Even in the everyday walks of life, we are completely inundated by commercialism. Practically every periodical, every newspaper, every available surface along our highways, carries propaganda that would convince the most skeptical that this worldly sojourn cannot be complete without the acquisition of this, that and the other thing.

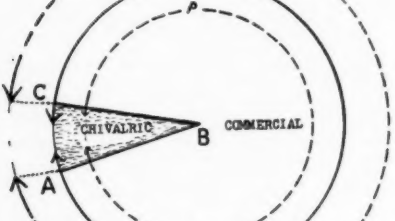
Propaganda of this nature is deemed so important that the best minds of the world are devoted to study of the precepts of trade acquisition. Thus, we find ourselves confronted by a very dangerous practice, particularly so for our educational systems, and our governmental agencies fail to counterbalance this selfish propaganda by inculcating in the masses the desire for those things which are essential for a maximum functioning of the human mechanism.

The trinity of religion, health service and education still embody as an integral part of their basic principles the spirit of chivalry, and we would not have it otherwise. Not for an instant would we see these professions throwing themselves into the maelstrom of modern advertising, of paid publicity. It is of prime importance that they familiarize themselves with the basic principles of commercial activity of the day, rather than assume the role of a modern Don Quixote and buckle on their ormor of self-righteousness and, without rhyme or reason, blindly charge the windmills of commercialism. We cannot by wishing change the political economy of the universe, but certainly by careful study we may, without a loss of prestige and self-respect, utilize certain advantages that are constantly at hand, to say nothing of those that occasionally arise.

To facilitate understanding the relation of modern commercialism to the so-called chivalric activities, the accompanying diagram is presented: Circle B, with the elastic limits of p and p' represents national income. The shaded segment *abc* represents the theoretical amount of the national income that could advantageously be expended to promote maximum functioning of the nation's human mechanism. Within the unshaded portion (commercial) of the circle, the struggle for commercial supremacy is

terrific and the ceaseless efforts for expansion have no bounds. Without intent, these commercial activities take the paths of least resistance, as shown by the arrows at *A* and *C*. These activities tend to encroach more and more on the chivalric sector, which is inadequately prepared to defend itself against the modern system of commercial invasion.

To repeat: Noncommercialism is the characteristic that distinguishes religion, health service and education from the common practices of our modern world. The reason for this is that this trinity is recognized as being absolutely indispensable to the functioning of humanity in this age of modernism and a lack of funds does not necessarily deprive an individual of its services. These facts are well understood by the general public, even to such a degree that they have bestowed on the trinity privileges and prerogatives which are not extended to purely commercial activities. Most assuredly, the trinity has achieved an enviable position, and must not make the ridiculous sacrifice of relinquishing that which long and faithful service has won.



Relation of modern commercialism to so-called chivalric activities.

The instant these three services enter the field of commercialism, they must abide by the laws of an entirely new game. In this game, they would be forced to be constantly on the alert to obtain their share of the federal income, and this could be accomplished only by securing just such an amount as would be exacted in terms of modern commercialism to hold a given position. If expansion were attempted, the point of diminishing returns would soon be reached.

Needless to say, a profession cannot for long subsist on the good opinion that humanity in general may have for it. The people of our nation may be willing to pay for service received from the chivalric professions, but it is impossible to pay without the means. It is, therefore, imperative that some course of lay education be followed which will assure us that an equitable portion of the family income will be set aside for the chivalric services, and thus make it difficult for modern commercialism to divert this fund to other channels. With the thought that some profits might accrue to dentistry, we will continue our study of modern commercial practices.

So successful has been this campaign of commerce and its intrinsic principle of time payments that, even among our so-called underprivileged classes, some means are invariably found to purchase nonessentials. Cars, radios, picture shows and liquor are prime requisites of life itself; while the satisfaction of the transient effect of beauty as offered by the cosmetician's art is much to be preferred to a square meal. The December, 1935, *Hygeia* carries an editorial, entitled "Cosmetics," wherein it is stated: "The original cost and upkeep on bobbed hair for mother and daughter in 1935 represents a sum beyond the total amount spent for the family in a year for medical care." And people will

have Simmons springs and mattresses for their beauty sleep, Fleischmann's yeast for indigestion, and so on down *ad infinitum*.

The question now naturally arises, why do people purchase nonessentials? The answer is, simply because they have been made conscious and are preserved in that state by repeated doses of cleverly conceived advertising. Strange to the dentist is the fact that beauty parlors are crowded with people, while dental offices show a shocking lack of patients.

But is it in reality so strange? Can it be that many of the misfortunes that have overtaken dentistry in recent times are in part the result of following the dictates of improperly functioning minds? Do not misunderstand me: I do not mean unintelligent minds, but minds that have been insufficiently trained in the basic principles of economics. Have we been adequately protected from the onslaught of modern commercialism? Is it reasonable to presume, in fact is it even possible, that the defenseless progeny of an age of chivalry can successfully function in this age of commercialism? It is a well-known fact that dentistry is not prospering in proportion to her capabilities for rendering service; not to mention the student years of careful preparation and its associated cost.

Is it possible that there is something wrong with our present system? Is our chivalric knight depriving us of opportunities that we can ill do without, by his persistence in the use of an inadequate and antiquated defensive mechanism? No one denies that chivalry is noble, but should it be allowed to deprive us of everything but a bare existence? No one denies that ideals are a precious possession, but must they not of necessity change with the times? Must they not keep pace with an ever-changing environment? In this connection, let me say that, not many years ago, the whole principle of charging interest on indebtedness was not only unethical but was also an offense punishable under the law. Not for an instant do we recommend that our Don Quixote follow such a course, but is it not time for him to open his visor to see where and how the knights of this modern age are getting their baskets filled? For this knowledge is absolutely necessary for the erection of an adequate defensive mechanism.

Our healing sects are waxing fat. Their propaganda must be palatable to the layman, for they are even patronized by otherwise intelligent people. Dentistry is a noble profession, and we are all proud of the progress that has been made within the range of our own memories. Dentistry has much to offer as a public servant. The question is, how are we to make our story known? How are we to make the public conscious? How are we to make people desire dental care as they do nonessentials? A change must be brought about, for measured by present demands of the public, dentistry as practiced today has no more place in a compulsory health insurance scheme (if it should come) than cosmetics, in fact less. The majority of people would all gladly pay for some type of insurance that would assure them cars and radios, but any health insurance scheme that assured them adequate dental service would in the end be paid for by the employer or the government. Dentistry is a fine profession and we are all proud of its achievements, and if we practice intelligently, we can do much to increase the longevity of man. But dentistry, in the strictest sense, is prevention, and prevention is not dramatic or spectacular and is only recognized for its full worth by the initiated. The foregoing facts cannot be consistently ignored in an ef-

fort to place dentistry in its rightful position in the present system of economy. Nor should we persistently ignore three possible methods whereby the demands for dentistry could be increased. We will briefly dispose of direct advertising (paid publicity); for once this policy is adopted, it would necessitate our following the path of a vicious cycle, with ever increasing momentum, until a time would arrive when the cost of the publicity would make the practice of our profession undesirable. Further, it would deprive us of a certain respect that has been conferred on us by an appreciative people.

Secondly let us consider indirect advertising. There are instances wherein our profession, because of circumstances over which we have no control, is intimately related to some form of commercial interest. Herein is a problem, and we anticipate that we might better serve both ourselves and humanity by an endeavor to correlate and direct the advertising of the commercial interests into channels of common benefit rather than to oppose it from an intolerant throne of self-righteousness. Our subsequent studies of indirect advertising (good-will publicity) will lead us to investigate established customs and precedents in our related professions and we will try to determine whether the results of following certain policies have proved satisfactory.

Third, and of vastly more importance than direct and indirect advertising, is the maximum utilization of our existent educational facilities. Dental education constitutes only a part of the mosaic of health education. Health education should not be one whit more complicated than any other subject and lasting benefits will accrue if it is developed on the principles employed in the teaching of religion. Certainly a child who is as familiar with the principles and practices of health as he is with a catechism is well educated.

As present day practices indicate that every profession is more or less concerned with its own particular problems, I should like to suggest that lasting benefits can be more readily obtained by interesting our educators in the problem of dental education and enlisting their specialized services in the promulgation of an educational plan satisfactory to all concerned. It is imperative, if maximum results are to be obtained, that teachers receive instruction from the profession along the lines of special education. We of the profession know pretty well the basic principles of dental education that should be inculcated within the child and thus passed on to the parent; but as regards the methods of presentation and actual teaching, we are not especially equipped and most assuredly should seek the assistance and cooperation of the teaching fraternity. In fact, we would even suggest that every dentist contribute to a fund that could be used to acquire the assistance of our educators in the problem of dental health education.

To repeat: It is imperative that instruction in dental health emanate from teachers with special training along this line. If this course is not followed, it is almost inevitable that students become lost in a maze of unanswerable contradictions. Furthermore, the effect of lay education for the elevation of professional standards cannot be minimized, and therefore should receive careful consideration.

To what extent are medicine and dentistry comparable? We would suggest that our chivalric knight of dentistry discard his helmet and look at the rest of the world; for too long has he deceived himself into the belief that medicine and dentistry were synonymous.

Positively, dentistry is not medicine, nor should it try to emulate or imitate that profession too closely; for despite the similarity of the two, there is still such a vast difference that where one will survive, the other will perish. Statistics tend to substantiate the view that dentistry is undergoing a very definite process of disintegration if the diminution of the number of our fraternity can be so interpreted.

Medicine is not so shy and timid as some of our dental leaders would have us believe. Medicine can be, and often is, spectacular; not unto itself alone, but to the whole world. A brilliant piece of surgery is news the world over; a new medical discovery, a new cure, and there is an immediate effect on thousands of suffering humanity. Naturally, it will be embraced by editors as front page material, and thus there is page after page of spontaneous publicity. This is right: The more spectacular, the greater the news value; therefore, there is profit accruing to the whole medical profession aside from the potential value of the discovery or cure within itself.

Poor lowly dentistry—not to disparage the good she is capable of—but what has dentistry to offer that is spectacular? What has she to offer that has real value as news from the point of view of the newspaper editor? We would say, "Very little." Practically every newspaper has syndicated articles written by medical men; not so with dentistry. Let any notable person consult a physician professionally and that is news, yet that same individual would have to die in the dentist's chair before his call on the dentist would be considered news. We have no suggestion as to a remedy for this situation, but its existence must be recognized in any comparison of the spontaneous publicity potentiality of medicine and of dentistry.

It is probably true that the ordinary run of work done by the physician is of no greater magnitude than that performed by the dentist, but there is one particularly striking contrast: the physician has a vast potential wealth in the publicity that is given the spectacular that is naturally inherent in the progress of his profession. This is not true in the case of a dentist. Of further and outstanding importance is the fact that not only current events, but also the commanding things of medical history are being constantly brought to the attention of the public. The great pharmaceutic houses have, within the past few years, as a gesture of helpfulness and friendliness toward medicine, poured a constant barrage of printed matter relating to outstanding medical men and events into the more prominent lay periodicals. We are not familiar with any move that the A.M.A. has made to curb this practice of semi-indirect advertising to the public, and it is our group opinion that there is no logical reason why they should do so.

I should like to commend the efforts of the Committee on Dental Therapeutics in their work on "Accepted Dental Remedies." Here is a service that is most commendable and not only perfectly logical but also indispensable to an intelligent practice of our profession. Why not follow up this work more assiduously by thorough revision? Above everything, the profession needs the latest advice on dental medicines and their various uses.

I am sure that the above suggested change would meet with the approval of a large majority of our profession and that the dentifrice manufacturers, being appreciative of the friendliness of our profession, would make possible the initiation of a new and fine period in their advertising that would prove mu-

tually pleasing and beneficial to all parties concerned.

SUMMARY

Practicability must determine the extent of the modification of the function of natural economic laws. A study of the modern practices of trade acquisition is necessary if we are to arrive at logical conclusions relative to dentistry's position in the present scheme of things.

Dentistry is in a large measure preventive, and therefore is not spectacular. For that reason it must not try to imitate the medical profession too closely, particularly in a plan of lay education. Dentistry, while not spectacular, is capable of accomplishing a valuable service and establishing a worthy place in the sun.

It is lamentable that medicine and dentistry cannot arrive at some mutually agreeable health educational plan and enlist the assistance and cooperation of the teaching profession.

Dentistry, in the absence of the abovementioned condition, should take every advantage of present-day educational facilities and should, with the cooperation of the educators and special teachers, achieve unsuspected heights in lay dental education; in fact, far superior to the doubtful results obtained by the use of the dangerous practice of paid publicity.

There might be a possibility of the dentifrice manufacturers' putting on a coordinated educational campaign that would be mutually satisfying and beneficial to all parties concerned.

CONCLUSION

Of first and foremost importance to dentistry is the close association of its man power. It is imperative that every ethical dentist in the United States be a member and take an active and thinking part in the affairs of the American Dental Association.

Dentistry has not as yet found her rightful place in our present system of economy, but must endeavor to do so. Furthermore, if she is to maintain her position as a part of the so-called chivalric activities, it is imperative that some defensive mechanism be constructed or erected to prevent further encroachments by the purely commercial interests.

If dentistry will honestly recognize that adequate dental service, as practiced at the present time, borders very closely on the semiluxurious, it need never fear any scheme of socialized dentistry.

Preventive dentistry (health education) is a necessity and cannot be forestalled much longer. When it comes, it will be primarily interested in children and of necessity both it and preventive medicine will in some way be bound up in our educational system.

THE COMMITTEE ON ECONOMICS NEEDS FACTS

The Committee on Dental Economics needs facts and figures on the practice of dentistry. There are a number of methods by which this information can be obtained, most of which are extremely costly and time consuming. After considerable deliberation, the committee has chosen this simple, direct and inexpensive method. The success of the venture will depend entirely on your cooperation. Help the Association, help the Committee and help yourself by filling out the form below and returning it in a blank envelope *now.*

This information is important in substantiating claims and making comparisons. It will be the exclusive property of the American Dental Association. *You will not be identified in any way.*

MAIL PROMPTLY TO THE SECRETARY, COMMITTEE ON ECONOMICS, AMERICAN DENTAL ASSOCIATION, 212 EAST SUPERIOR STREET, CHICAGO, ILLINOIS

Number of years in practice of dentistry_____ Age_____

In general practice_____ or specialized in_____

Gross income from practice in 1935 $_____ 1932 $_____

Total office expenses in 1935 $_____ 1932 $_____

Office rent 1935 $_____ 1932 $_____

Office assistant's salary 1935 $_____ 1932 $_____

Net income from practice 1935 $_____ 1932 $_____

Loss from bad credits 1935 $_____% 1932_____%

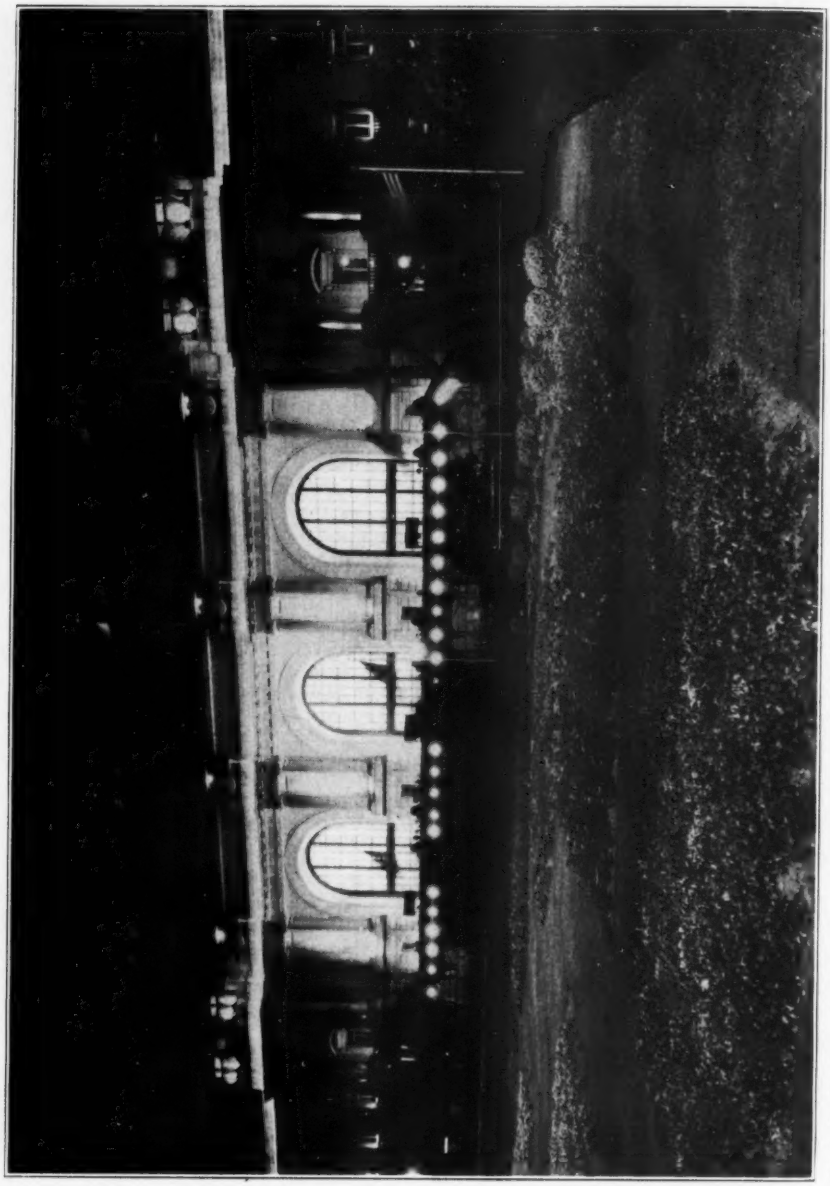
The present value of my strictly dental equipment is approximately $_____

The area in which I practice is largely, agricultural, commercial, manufacturing, residential. (Underline)

Population of town in which I practice_____

Name of state_____ Number of dependents_____

DO NOT SIGN



Civic Auditorium, San Francisco, where the Seventy-Eighth Annual Session of the American Dental Association will be held, July 13-17.

AMERICAN DENTAL ASSOCIATION SEVENTY-EIGHTH ANNUAL SESSION

SAN FRANCISCO, CALIF., JULY 13, 14, 15, 16, 17, 1936

OFFICIAL CALL

To the Members of the American Dental Association:

You are hereby notified that the Seventy-Eighth Annual Session of the American Dental Association will be held in San Francisco, Calif., July 13-17, 1936.

The House of Delegates will convene at 10:00 a.m., Monday, July 13. The second meeting will be held at 2:30 p.m., Monday, July 13; the third meeting at 2:30 p.m., Wednesday, July 15, and the fourth meeting at 2:30 p.m., Thursday, July 16. The four meetings of the House of Delegates will be held in the Hotel St. Francis. The Credentials Committee will register Delegates and Alternates, beginning at 10:00 a.m., Sunday, July 12, at the Hotel St. Francis.

All other members will register at the Registration Office, in the Exposition Auditorium. The Registration Department will be open from 9:00 a.m. to 5:00 p.m., Sunday, July 12, and from 8:30 a.m. to 5:00 p.m., Monday, Tuesday, Wednesday, Thursday and Friday, July 13, 14, 15, 16 and 17.

The General Meeting which constitutes the opening exercises of the Session will be held Tuesday, July 14, at 9:30 a.m. The second General Meeting will be held on Tuesday July 14, at 7:45 p.m. The first and second General Meetings will be held in the Colonial Ballroom of the Hotel St. Francis.

The constituent societies are hereby notified to file with the Secretary of this Association at least thirty (30) days prior to the first day of said Annual Session a list of the names and addresses of their Delegates and Alternates.

GEORGE B. WINTER, *President,*
HARRY B. PINNEY, *Secretary.*

GENERAL PROGRAM

Registration (General).....Sunday, July 12, 9:00 a.m.
(Exposition Auditorium)
Registration (Delegates and Alternates).....Sunday, July 12, 10:00 a.m.
(Hotel St. Francis)
Board of Trustees (First Meeting).....Friday, July 10, 10:00 a.m.
(Hotel St. Francis)
Board of Trustees (Second Meeting).....Saturday, July 11, 10:00 a.m.
(Hotel St. Francis)
House of Delegates (First Meeting).....Monday, July 13, 10:00 a.m.
(Hotel St. Francis)
House of Delegates (Second Meeting).....Monday, July 13, 2:30 p.m.
(Hotel St. Francis)
House of Delegates (Third Meeting).....Wednesday, July 15, 2:30 p.m.
(Hotel St. Francis)
House of Delegates (Fourth Meeting).....Thursday, July 16, 2:30 p.m.
(Hotel St. Francis)

PRELIMINARY PROGRAM FOR SAN FRANCISCO SESSION

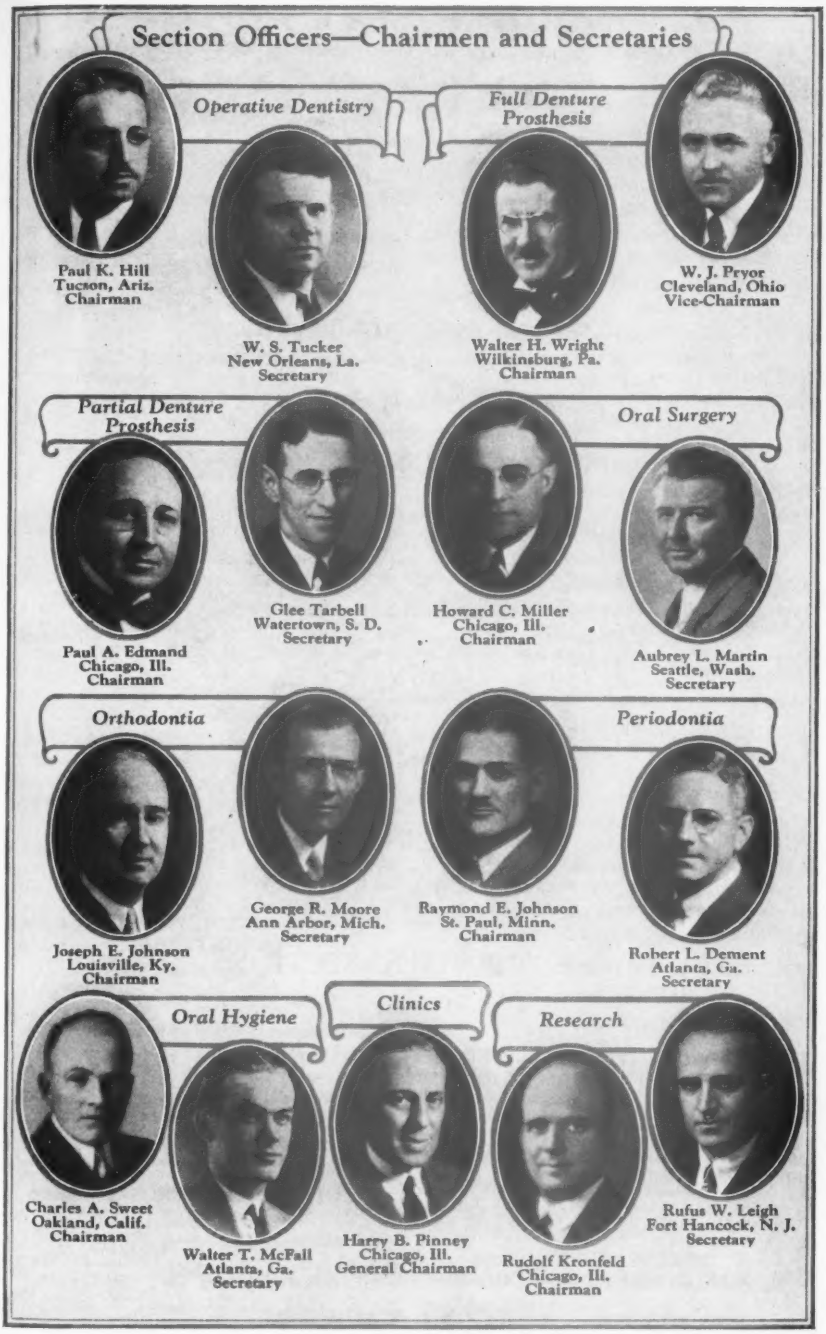
FIRST GENERAL MEETING

(Colonial Ballroom, Hotel St. Francis)

TUESDAY, JULY 14

Fred J. Wolfe, First Vice President, Presiding

9:30 a.m. Music (Orchestra)
10:00 Invocation
Bishop Edward Land Parsons.....San Francisco, Calif.
10:05 Music (Orchestra)
10:15 Greetings from City of San Francisco
Mayor Angelo Rossi.....San Francisco, Calif.
10:20 Greetings from City of Oakland
Mayor William J. McCracken.....Oakland, Calif.
10:25 Greetings from Local Arrangements Committee
Raoul H. Blanquie, General Chairman.....San Francisco, Calif.
10:35 Address of Welcome from San Francisco District Dental Society
Reuben L. Blake, President.....San Francisco, Calif.
10:45 Address of Welcome from the California State Dental Association
Sanford M. Moose, President.....San Francisco, Calif.



CHAIRMEN AND SECRETARIES OF THE SCIENTIFIC SECTIONS OF THE AMERICAN DENTAL ASSOCIATION, 1936

10:55 Response of the American Dental Association
C. Raymond Wells.....Brooklyn, N. Y.
11:10 Music (Orchestra)
Introduction of Foreign Visitors
11:15 President's Address
George B. Winter.....St. Louis, Mo.

SECOND GENERAL MEETING

(Colonial Ballroom, St. Francis Hotel)

TUESDAY, JULY 14

Fred R. Adams, Second Vice President, Presiding

7:45 p.m. Music (Orchestra)
8:00 Address: "The Oregon Dental Practice Act—What It Has Accomplished, What It Means and Its Limitations"
Judge Lawrence T. Harris.....Eugene, Ore.
8:40 Music (Orchestra)
8:45 Address: "A Study of General Infection from Infected Teeth"
F. N. Doubleday.....London, England
9:25 Music (Orchestra)

THIRD GENERAL MEETING

(Mural Room, Hotel St. Francis)

THURSDAY, JULY 16

8:00 p.m. Dinner Dance (Formal)
In honor of retiring President, George B. Winter.

THE SCIENTIFIC SECTIONS

TUESDAY, JULY 14

OPERATIVE DENTISTRY, MATERIA MEDICA AND THERAPEUTICS

(Auditorium)

OFFICERS OF SECTION

Paul K. Hill, Chairman.....Tucson, Ariz.
William A. Garrett, Vice Chairman.....Atlanta, Ga.
W. S. Tucker, Secretary....New Orleans, La.

2:30 to 5:00 p.m.

2:30 "Some Inconsistencies in Operative Work"
By James Mark Prime....Omaha, Nebr.
3:15 "Gingival Foils—Types and Variations"
By E. M. Jones.....Los Angeles, Calif.
4:00 "Consideration of Amalgam and Its Application in Operative Dentistry"
By George M. Hollenback.....Los Angeles, Calif.

FULL DENTURE PROSTHESIS

(Auditorium)

OFFICERS OF SECTION

Walter H. Wright, Chairman.....Wilkinsburg, Pa.
W. J. Pryor, Vice Chairman.Cleveland, Ohio

Irving R. Hardy, Secretary...New York City

2:30 to 5:00 p.m.

2:30 "Art—A Fundamental in Dental Prosthesis"
By M. M. House.....Whittier, Calif.

3:15 "Denture Prosthesis—An Accredited Oral Health Service"
By Harry V. Holcomb.....
.....Los Angeles, Calif.

4:00 "Tooth Arrangement in Complete Denture Prosthesis"
By R. O. Schlosser.....Chicago, Ill.

PARTIAL DENTURE PROSTHESIS

(Auditorium)

OFFICERS OF SECTION

Paul A. Edmand, Chairman.....Chicago, Ill.
C. W. Swords, Vice Chairman...Miami, Fla.
Glee Tarbell, Secretary....Watertown, S. D.

2:30 to 5:00 p.m.

2:30 "Osseous Changes in the Alveolar Process and Their Effect on Partial Replacements"
By Frank H. McKevitt.....
.....San Francisco, Calif.

3:15 "Method of Diagnosing and Treating Cases Requiring Repositioning the Mandible and Rebuilding Occlusal Surfaces of the Teeth"
By E. E. Bailey.....Denver, Colo.

4:00 "Ridge Balance"
By Rupert E. Hall.....Chicago, Ill.

ORAL SURGERY, EXODONTIA AND ANESTHESIA

(Auditorium)

OFFICERS OF SECTION

Howard C. Miller, Chairman...Chicago, Ill.
Theodor Blum, Vice Chairman New York City
Aubrey L. Martin, Secretary...Seattle, Wash.

2:30 to 5:00 p.m.

2:30 "Technics of Oral Diagnosis"
By Leroy M. S. Miner.....Boston, Mass.

3:15 "Interpretive Radiodontia from the Standpoint of Anatomy"
By Walter S. Thompson.....
.....Los Angeles, Calif.

4:00 "Practical Value of the Newer Anesthetics for Topical and Injection Anesthesia"
By M. L. Tainter (M.D.).....
.....San Francisco, Calif.

ORTHODONTIA

(Auditorium)

OFFICERS OF SECTION

Joseph E. Johnson, Chairman.Louisville, Ky.
Richard Lowy, Vice Chairman.Newark, N. J.
George R. Moore, Secretary..Ann Arbor, Mich.

2:30 to 5:00 p.m.

2:30 "Adult Orthodontic Therapy—A Practical Aid to the General Practitioner"
By Earl F. Lussier..San Francisco, Calif.

3:15 "Postgraduate Orthodontic Instruction and the Licensing of Specialists"
By Homer B. Robison..Hutchinson, Kan.

4:00 "Articulation as an Orthodontic Aim"
By Harvey Stallard....San Diego, Calif.

PERIODONTIA

(Auditorium)

OFFICERS OF SECTION

Raymond E. Johnson, Chairman.....
..... St. Paul, Minn.
Clyde C. Sherwood, Vice Chairman.....
.....Toledo, Ohio
Robert L. Dement, Secretary....Atlanta, Ga.

2:30 to 5:00 p.m.

Symposium: "Common Diseases of the Periodontium"

2:30 "Gingivitis"
By Grace Rogers Spalding.....
.....Birmingham, Mich.

3:15 "Vincent's Infection"
By Arthur H. Merritt....New York City

4:00 "Periodontoclasia"
By Harold J. Leonard....New York City

CHILDREN'S DENTISTRY AND ORAL HYGIENE

(Auditorium)

OFFICERS OF SECTION

Charles A. Sweet, Chairman..Oakland, Calif.
Richard C. Leonard, Vice Chairman.....
.....Baltimore, Md.
Walter T. McFall, Secretary....Atlanta, Ga.

2:30 to 5:00 p.m.

2:30 "Preventive Orthodontics"
By R. C. Willett.....Peoria, Ill.

3:15 "Problem of the First Permanent Molar and Prophylactic Odontotomy"
By Walter C. McBride....Detroit, Mich.
Discussed by
Konrad Lux.....Waco, Texas

4:00 "Devitalized Deciduous Teeth"
By Herbert R. Foster....Oakland, Calif.
Discussed by
Haidee Weeks.....New Orleans, La.

HISTOLOGY, PHYSIOLOGY, PATHOLOGY, BACTERIOLOGY AND CHEMISTRY (RESEARCH)
(Auditorium)

OFFICERS OF SECTION

Rudolf Kronfeld, Chairman.....Chicago, Ill.
Myron S. Aisenberg, Vice Chairman.....
.....Baltimore, Md.
Rufus W. Leigh, Secretary .Fort Hancock, N. J.

2:30 to 5:00 p.m.

2:30 "Significance of Presence of Fusiform Bacilli and Spirilla in Gingival Tissues"
By Ruth Tunnicliff (M.D.)..Chicago, Ill.
E. B. Fink (M.D.).....Chicago, Ill.
Carolyn Hammond.....Chicago, Ill.
3:15 "Diet in Relation to Gingivitis (Field Observations in New Guinea)"
By R. M. Kirkpatrick..Sydney, Australia
4:00 "Diagnosis"
By Edward Reiter.....Cleveland, Ohio
4:25 "Simple Method of Improving Amalgam Restorations"
By Francis A. Bull.....Milwaukee, Wis.

WEDNESDAY, JULY 15

OPERATIVE DENTISTRY, MATERIA MEDICA AND THERAPEUTICS
(Auditorium)
9:30 a.m. to 12:00 m.

9:30 "Practical Suggestions on Inlay Construction"
By C. H. Scheu.....Lakewood, Ohio
10:15 "Simple Control for Practical Castings"
By R. E. Sturdevant.....Lincoln, Nebr.
11:00 "Use of Obtundent in Operative Dentistry"
By Leroy L. Hartman....New York City

FULL DENTURE PROSTHESIS
(Auditorium)
9:30 a.m. to 12:00 m.

9:30 "Metal Die Technic for Curing Rubber and Thermoplastics"
By Charles S. Ballard.....Seattle, Wash.
10:15 "Relation of the Dentist to the Commercial Dental Laboratory"
By Clyde H. Schuyler...New York City
11:00 "Immediate Denture Service"
By J. F. Mauer.....Los Angeles, Calif.

PARTIAL DENTURE PROSTHESIS
(Auditorium)
9:30 a.m. to 12:00 m.

9:30 "Mineralization and Demineralization of the Maxilla and the Mandible"
By Boyd S. Gardner....Rochester, Minn.
10:15 "Practical Application of a New and Scientific Method of Producing Temporomandibular Roentgenograms"
By L. B. Higley.....Iowa City, Iowa
11::00 "Analytic Study of Modern Abutments"
By Arthur O. Klaffenbach.Iowa City, Iowa

ORAL SURGERY, EXODONTIA AND ANESTHESIA
(Auditorium)
9:30 a.m. to 12:00 m.

9:30 "Fundamentals of Nitrous Oxide-Oxygen Anesthesia"
By George W. Christensen.Detroit, Mich.
10:15 "Surgery for the Denture Patient"
By O. T. Dean.....Seattle, Wash.
11:00 "Rational Therapeutic Use of Thermal Agents in the Handling of Oral Maladies"
By Sanford M. Moose.....
.....San Francisco, Calif.

ORTHODONTIA
(Auditorium)
9:30 a.m. to 12:00 m.

9:30 "Prevention—The New Demand on Dentists and Orthodontists"
By Harvey A. Stryker.....
.....San Francisco, Calif.
10:15 "The Mandible and Its Postnatal Growth in the Development of the Dental Mechanism"
By Robert Dunn....San Francisco, Calif.
11:00 "Diagnosis and Treatment of Deficient Mandibular Structures in Children"
By James D. McCoy..Los Angeles, Calif.

PERIODONTIA
(Auditorium)
9:30 a.m. to 12:00 m.

9:30 "Importance of Mouth Brushing"
By Frederick A. Bricker.....
.....Los Angeles, Calif.
10:15 "The Individual Missing Tooth—a Factor in Dental or Periodontal Disease"
By Isador Hirschfeld....New York City
11:00 "Calcium Metabolism in Its Relation to Endocrine Function and Bone Growth"
By Ralph A. Reynolds (M.D.).....
.....San Francisco, Calif.

CHILDREN'S DENTISTRY AND ORAL HYGIENE

(Auditorium)

9:30 a.m. to 12:00 m.

9:30 "Relationship of Public Health to Children's Dentistry"
By Charles F. Deatherage.....Springfield, Ill.

Discussed by
Guy S. Millberry...San Francisco, Calif.

10:15 "Arrest of Dental Caries—Subsequent Observations"
By Charles L. Drain.....Iowa City, Iowa

Discussed by
Henry E. Stafford (M.D.) .Oakland, Calif.

11:00 "Treatment and Restoration of Fractured Permanent Anterior Teeth"
By John C. Brauer.....Lincoln, Nebr.

HISTOLOGY, PHYSIOLOGY, PATHOLOGY, BACTERIOLOGY AND CHEMISTRY (RESEARCH)

(Auditorium)

9:30 a.m. to 12:00 m.

9:30 "Histologic Verification of Root Canal Therapy in Experimental Animals"
By C. M. Dixon.....Ann Arbor, Mich.

10:15 "Four Year Study of Student Health Service, Including Medical, Dental and Nutritional Summary"
By Lloyd G. Welty.....Oakland, Calif.

11:00 "Etiologic Factors in Symptomatic Neuralgia and Tic Douloureux"
By Don J. Aubertine.....San Francisco, Calif.

OPERATIVE DENTISTRY, MATERIA MEDICA AND THERAPEUTICS

(Auditorium)

2:30 to 5:00 p.m.

2:30 "Drugs—Their Use and Abuse in Operative Dentistry"
By John E. Gurley..San Francisco, Calif.

3:15 "Therapeutics—As It Is Practiced"
By Gerald D. Timmons.....Indianapolis, Ind.

Discussed by
U. Garfield Rickert....Ann Arbor, Mich.

4:00 "Current Progress in General and Local Anesthesia as Applicable to Dentistry"
By Chauncey D. Leake.....San Francisco, Calif.

Discussed by
C. Dudley Gwinn..San Francisco, Calif.

FULL DENTURE PROSTHESIS

2:30 to 5:00 p.m.

(Auditorium)

2:30 "Masticatory Efficiency as Related to Cusp Form in Denture Prosthesis"
By Morris J. Thompson.....Los Angeles, Calif.

3:15 "Physical Properties of Denture Base Materials and a Résumé of the Cooperative Work of the Bureau of Standards and the American Dental Association"
By W. T. Sweeney (Ph.D.).....Washington, D. C.

4:00 "Alveolar Bone in Relation to Denture Prosthesis"
By V. C. Smedley.....Denver, Colo.

PARTIAL DENTURE PROSTHESIS

(Auditorium)

2:30 to 5:00 p.m.

2:30 "Reaction of Tissues to Pressure Under Partial Restorations"
By Hugh W. MacMillan.....Cincinnati, Ohio

3:15 "Cast Preparation for the Immediate Restoration"
By F. W. Frahm.....Los Angeles, Calif.

4:00 "Preparation of Vital Teeth for the Reception of Porcelain Jacket Crowns"
By William H. Squires...New York City

ORAL SURGERY, EXODONTIA AND ANESTHESIA

(Auditorium)

2:30 to 5:00 p.m.

2:30 "Trifacial Neuralgia"
By Byron E. Loomis.....Portland, Ore.

3:15 "Oral Disease and Its Effect on General Health"
By Walter H. Brown (M.D.).....Palo Alto, Calif.

4:00 "Modern Cleft Palate and Cleft Lip Surgery" (Illustrated by talking motion pictures in color)
By Arthur E. Smith..Los Angeles, Calif.

ORTHODONTIA

(Auditorium)

2:30 to 5:00 p.m.

2:30 "Experimental Resorption and Regeneration of Dento-Alveolar Tissues"
By John A. Marshall.....San Francisco, Calif.

3:15 "Is Orthodontics for the Orthodontist?"
By Walter T. McFall.....Atlanta, Ga.

4:00 "Dissemination of Acceptable Orthodontic Information"
By Hugh Grun Tanzey.....
.....Kansas City, Mo.

PERIODONTIA
(Auditorium)
2:30 to 5:00 p.m.

2:30 "Possibilities and Limitations of Various Modes of Periodontal Treatment"
By Raoul H. Blanquie.....
.....San Francisco, Calif.

3:15 "Relation of Restorative Dentistry to Periodontal Disease"
By J. Raymond Gill.....
.....San Francisco, Calif.

4:00 "Review of Periodontal Diseases"
By M. Monte Bettman....Portland, Ore.

CHILDREN'S DENTISTRY AND ORAL HYGIENE
(Auditorium)
2:30 to 5:00 p.m.

2:30 "Cavity Preparation for Deciduous Teeth"
By George E. Morgan..Milwaukee, Wis.
Discussed by
Samuel D. Harris.....Detroit, Mich.

3:15 "Bridgework for Children; Its Planning and Construction from the Point of View of the Orthodontist"
By Leonard Kohn.....Brooklyn, N. Y.

4:00 "Use of the Roentgen Rays in the Practice of Children's Dentistry"
By Henry Cline Fixott....Portland, Ore.

HISTOLOGY, PHYSIOLOGY, PATHOLOGY, BACTERIOLOGY AND CHEMISTRY (RESEARCH)
(Auditorium)
2:30 to 5:00 p.m.

3:15 "Definite Plan for Dental Research"
By Withrow Morse (Ph.D.).....
.....Chicago, Ill.
Alfred Walker.....New York City

4:00 "Observations on Age Incidence in Dental Caries"
By Mary M. Moore....Philadelphia, Pa.

THURSDAY, JULY 16

OPERATIVE DENTISTRY, MATERIA MEDICA AND THERAPEUTICS
(Auditorium)
9:30 a.m. to 12:00 m.

9:30 "Management of Endangered and Involved Pulps"
By W. Clyde Davis.....Lincoln, Nebr.

10:45 "Practical Points in the Pulpless Tooth Problem"
By M. D. Huff.....Atlanta, Ga.

11:00 "Visibility in Dentistry—Illumination and Transillumination"
By A. Laurence Dunn.....
.....Santa Barbara, Calif.
Discussed by
Carl D. Lucas.....Los Angeles, Calif.
John P. Buckley.....Los Angeles, Calif.

FULL DENTURE PROSTHESIS
(Auditorium)
9:30 a.m. to 12:00 m.

10:15 "Faciodental Restorations as Related to Denture Prosthesis"
By Kent K. Cross.....Denver, Colo.

11:00 "Gnathodynamics in Relation to Denture Prosthesis"
By David W. McLean.....
.....Los Angeles, Calif.

PARTIAL DENTURE PROSTHESIS
(Auditorium)
9:30 a.m. to 12:00 m.

10:15 "Is It Necessary to Replace Missing Teeth?"
By B. B. McCollum...Los Angeles, Calif.

ORAL SURGERY, EXODONTIA AND ANESTHESIA
(Auditorium)
9:30 a.m. to 12:00 m.

9:30 "Suggested Cooperation Between the Dentist and the Oral Surgeon in Complicated Antrum Cases"
By Harry E. Straub..Los Angeles, Calif.

9:55 "Some Advantages of a Definite Though Elastic Technic in the Extraction of Teeth"
By C. Maynard Woodward.....
.....Pasadena, Calif.

10:20 "Motion Pictures of Cases in Oral Surgery"
By Harry M. McFarland.....
.....Kansas City, Mo.

10:45 "Causes and Treatment of Hemorrhage"
By Leslie M. Fitzgerald.....
.....Dubuque, Iowa

11:10 "Acute Oral Infections"
By A. L. Frew.....Dallas, Texas

11:35 "Preliminary and Postoperative Treatment in Oral Operations"
By Menifee R. Howard...Denver, Colo.

ORTHODONTIA

(Auditorium)

9:30 a.m. to 12:00 m.

9:30 "Betty's Crooked Teeth" (A Motion Picture)
By Thomas B. McCrum .Kansas City, Mo.

10:15 "Metallurgy and Uses of Chrome Alloy in Orthodontia"
By J. Lyndon Carmen.....Denver, Colo.

11:00 "Strategy of Orthodontic Treatment"
By Spencer R. Atkinson.Pasadena, Calif.

PERIODONTIA

(Auditorium)

9:30 a.m. to 12:00 m.

9:00 to 11:15 Symposium: A report on investigations being carried out on San Quentin Prison inmates to determine what health reactions follow the surgical removal of gingival and paradental infections (pyorrhea)

"Outline of Plan and Its Purpose"
By Paul J. Boyens..San Francisco, Calif.

"General Health Survey of Patients with Paradental Infections and Systemic Reactions After Treatment"
By Alexander G. Bartlett (M.D.)....
.....San Francisco, Calif.

"Studies of Laboratory Findings in Paradental Infections"
By Hilario G. Marquez (Ph.D.).....
.....San Francisco, Calif.

"Paradental Infections as Related to Prostatic Infection"
By George F. Oviedo (M.D.).....
.....San Francisco, Calif.

Discussed by
I. C. Gobar (M.D.).San Francisco, Calif.

CHILDREN'S DENTISTRY AND ORAL HYGIENE

(Auditorium)

9:30 a.m. to 12:00 m.

9:30 "Is Teen-Age Caries an Endocrine Problem?"
By Floyde E. Hogeboom.....
.....Los Angeles, Calif.

Discussed by
Hans Lisser (M.D.).San Francisco, Calif.

10:15 "Education of the School Child for Dental Health: What Can the Dental Society, the Dentist, the School and the Home Do?"
By Jacob M. Wisan.....Elizabeth, N. J.

Discussed by
Richard C. Leonard.....Baltimore, Md.

11:10 Playlet—"It's Only a Baby Molar"
Dentist, C. Porter McKeehan.....
.....Oakland, Calif.
Patient, D. H. Julienne..Hayward, Calif.
Mother, Doris M. George.Berkeley, Calif.
Father, Ralph O. Wagner.Oakland, Calif.
Dental Assistant, Mrs. Montana Ennerson .....Oakland, Calif.

HISTOLOGY, PHYSIOLOGY, PATHOLOGY, BACTERIOLOGY AND CHEMISTRY (RESEARCH)

(Auditorium)

9:30 a.m. to 12:00 m.

9:30 "Study of Bone and Tooth Development: Deposition of Calcium in Developing Teeth of Rats"
By E. Alfred Wolf (Ph.D.).....
.....Pittsburgh, Pa.
T. F. McBride.....Pittsburgh, Pa.

10:15 "Evidence of a Relationship Between Nutrition, Saliva Chemical Content and Dental Caries Immunity"
By Weston A. Price.....Cleveland, Ohio

11:00 "Effects of Estrogenic and Gonadotropic Hormones on the Gums and Oral Mucous Membranes of Female Macacus Rhesus Monkeys"
By Daniel E. Ziskin.....New York City
Solon N. Blackberg (Ph.D.).....
.....New York City

Japanese tea gardens, Golden Gate Park, San Francisco.

GENERAL CLINIC PROGRAM

THURSDAY AFTERNOON AND FRIDAY, JULY 16-17

GROUP 1: COLLEGE CLINICS

College of Physicians and Surgeons, School of Dentistry, San Francisco

"Gold Foil Operations"
Members of Golden Gate Study Club
Mitchell J. Bilafer..San Francisco, Calif.
Edward P. Boero...San Francisco, Calif.
Frank H. Howard....San Rafael, Calif.
Harold R. Buschke.....Tracey, Calif.
A. R. Sanchez-Corea.San Francisco, Calif.

State University of Iowa

"Wrought Clasps"
Charles K. Reger.....Iowa City, Iowa

"New Apparatus for Scientific Production of Photographic and Roentgenographic Records, Especially of Temporomandibular Articulation"
L. B. Higley.....Iowa City, Iowa

"Improved Cavity Preparation Showing Samples of Work on Natural Teeth"
O. I. Cook.....Des Moines, Iowa

University of Buffalo, School of Dentistry

"Vincent's Infection"
Edward F. Mimmack.....Buffalo, N. Y.

University of Nebraska, College of Dentistry

"Controlled Inlay Casting"
R. E. Sturdevant.....Lincoln, Nebr.

Temple University Dental School

"Local Anesthesia"
Alfred M. Haas.....Philadelphia, Pa.

GROUP 2: SECTION CLINICS

Operative Dentistry, Materia Medica and Therapeutics

"Consideration of Amalgam and Its Application in Operative Dentistry"
George M. Hollenback.....
.....Los Angeles, Calif.

Full Denture Prosthesis

"Metal Die Technic for Curing Rubber and Thermoplastics"
Charles S. Ballard.....Seattle, Wash.

"Faciodental Restorations as Related to Denture Prosthesis"
Kent K. Cross.....Los Angeles, Calif.

"Tooth Arrangement in Complete Denture Prosthesis"
R. O. Schlosser.....Chicago, Ill.

Orthodontia

"Models of and Other Data on Dental Anomalies to Illustrate the Age at Which to Begin Treatment"
F. W. Nash.....Scranton, Pa.

"Early Facial Corrections"
Kirman E. Taylor.....Denver, Colo.

"Record-Keeping of Shedding of Deciduous Teeth and Eruption of Permanent Teeth"
Asa J. LaGrow.....Oak Park, Ill.

"Silver Nitrate as a Protection Against Caries Beneath Anchor Bands"
Frederic J. Murlless.....Hartford, Conn.

"Practical Time Saving Orthodontic Instruments"
A. G. Swinehart.....Baltimore, Md.

"Gnathostatic Diagnosis in Orthodontia"
B. L. Herzberg.....Chicago, Ill.

"Simple Way to Make a Twin Wire Alinement Arch"
Joseph E. Johnson.....Louisville, Ky.

"Coil Springs to Open Spaces"
Richard Lowy.....Newark, N. J.

"Dental Anomalies: Early and Advanced Stages That Should Be Recognized by the General Practitioner and Wherein Cooperation with the Orthodontist Is Urgent"
Hugh Grun Tanzey....Kansas City, Mo.

Children's Dentistry and Oral Hygiene

"Amalgam Restorations in Deciduous Teeth"
W. M. Cameron....San Francisco, Calif.

"Dental Records for Children's Dentistry"
Charlotte S. Greenhood.....
.....San Francisco, Calif.

"Pulp Capping Deciduous Teeth"
E. Pearl Hannah.....Palo Alto, Calif.

"Root Canal Treatment for Deciduous Teeth"
Jean McIntyre.....Oakland, Calif.

"Treatment and Restoration of Fractured Permanent Anterior Teeth"
John C. Brauer.....Lincoln, Nebr.

"Bridgework for Children: Its Planning and Construction from the Point of View of the Orthodontist"
Leonard Kohn.....Brooklyn, N. Y.

"Arrest of Dental Caries—Subsequent Observations"
Charles L. Drain.....Iowa City, Iowa

"Education of the School Child for Dental Health: What Can the Dental Society, the Dentist, the School and the Home Do?"
Jacob M. Wisan.....Elizabeth, N. J.

"Relationship of Public Health to Children's Dentistry"
Charles F. Deatherage...Springfield, Ill.

"Use of Scrapbooks for Amusement of Children in the Reception Room"
Louis W. Schmohl, Jr.....
.....San Francisco, Calif.

Histology, Physiology, Pathology, Bacteriology and Chemistry (Research)

"Aboriginal California"
R. W. Leigh.....Fort Hancock, N. J.

GROUP 3: STATE ASSOCIATION INDIVIDUAL CLINICS AND GROUP CLINICS

"Dentures and Obturators for Cleft Palate Cases"
E. H. Mauk.....San Francisco, Calif.

"Sectional Impression Technic for Immediate Denture Insertion"
Frank E. Wood.....Seattle, Wash.

"Ridge Bearing Palateless Dentures"
Glenn B. Garrett.....Portland, Ore.

"Preoperation Data Required in Immediate Denture Service"
J. F. Steffan.....San Francisco, Calif.
Harry Berger.....San Francisco, Calif.

"Centric Occlusion—Protrusive and Lateral Records"
S. C. Robinson.....Portland, Ore.

"Relative Study of the Masticating Efficiency of Natural Dentition and Artificial Dentures"
C. N. Skinner.....Whittier, Calif.

"Full Impression and Centric Bite"
Karl J. Humphreys...Los Angeles, Calif.

"Impressions"
R. E. Keys.....San Francisco, Calif.
H. E. Ridenour.....San Francisco, Calif.

"Negative Plaster Impressions, Outlining and Cast Beading"
W. A. Colburn.....San Francisco, Calif.

"Maxillary and Mandibular Impressions—Esthetics and Mechanics in Arranging Teeth"
J. Werner.....San Francisco, Calif.
Chester M. Cusick.....Berkeley, Calif.
J. E. Meadows.....San Francisco, Calif.

"Esthetics and Retention in Immediate Dentures"
Hugh X. Ford.....Sacramento, Calif.

"Abbreviated Full Denture Technic"
Elmer W. Bunce.....Los Angeles, Calif.

"Full Dentures"
Morris J. Thompson..Los Angeles, Calif.

"Full Denture Procedures"
Wilfrid Hall Terrell...Pasadena, Calif.

"Upper Rebasing"
Fred E. Gulick.....Portland, Ore.

"Balanced Dentures That Require No Spot nor Mouth Grinding"
C. J. Stansbery.....Seattle, Wash.

"Esthetics in Denture Construction and the Use of Porcelain as a Denture Base Material"
James L. Howard.....Hollywood, Calif.

"Fixed Bridgework"
John Kuratli.....Portland, Ore.

"Partial Removable Restorations"
Rollin H. Irons.....San Jose, Calif.

Group Clinic

Progressive Group Clinic on Fixed Bridgework

Donald E. Smith.....Hollywood, Calif.
Harry R. Potter.....Los Angeles, Calif.
James M. Hixson....Los Angeles, Calif.
Corydon J. Glazier....Hollywood, Calif.
Samuel B. Peterson.....Glendale, Calif.
Robert E. Willey.....Los Angeles, Calif.

"Some Modifications of Fixed Bridgework"
E. D. Shooshan.....Pasadena, Calif.

"Visualizing Dental Cripples"
Nye White Goodman.Los Angeles, Calif.

"Restorative Dentistry"
J. Raymond Gill...San Francisco, Calif.

"Partial Denture Prosthesis"
George A. Selleck..San Francisco, Calif.

"Removable Fixed Bridgework"
S. E. West.....San Francisco, Calif.

"Fixed Partial Restorations"
Alver Selberg.....San Francisco, Calif.

"Porcelain Lower Bicuspid and Molar with Cast Gold Reinforced Support"
J. E. Argue.....Seattle, Wash.

"Technic for Baking Porcelain Directly to a Cast Gold Alloy for Porcelain Faced Crowns"
Robert C. Zeisz.....San Francisco, Calif.

"Preparations for Partial Dental Prosthesis"
Frank C. Bettencourt.....
.....San Francisco, Calif.

"Functional Checkbites in Class I Partial Denture Cases"
G. A. Hughes.....Oakland, Calif.

Group Clinic

"Problems of the Cast Gold Inlay"
Ernest H. Goering...Los Angeles, Calif.
John W. Wilson.....Santa Ana, Calif.
Charles F. Rapp.....Fullerton, Calif.

San Francisco—Oakland bridge.

H. M. Hales.....Los Angeles, Calif.
M. E. Ralston.....Pomona, Calif.
R. G. Waterhouse.....Pasadena, Calif.
F. A. Brown.....Pasadena, Calif.
John P. Pursell.....El Segundo, Calif.

"Silicate Cements—Their Behavior and Possibilities"
J. W. Roush.....Oakland, Calif.

"Electric Casting Process"
E. H. Berryman....San Francisco, Calif.

"Root-Canal Treatment and Surgery"
M. Thayer Rhodes.....Berkeley, Calif.

"Elimination of Pain in Cavity Preparation"
J. P. Buckley.....Hollywood, Calif.
C. E. Buckley.....Hollywood, Calif.

"Fundamental Principles of Dental Castings"
Daniel Ransdell....San Francisco, Calif.

"Simple Method of Making Accurate Fitting Inlays"
John T. Ryan.....Mt. Vernon, Wash.

"Topographic Anatomy of the Tooth; Its Clinical Application in Cavity Preparation"
Stanley F. Erpf.....San Francisco, Calif.

"Important Points in Technic from Cavity Preparation to Finished Inlay"
D. L. Durst.....Sacramento, Calif.

"Dental Anatomy"
Lawrence O. Vireno. San Francisco, Calif.

"Efforts That Justify the Use of Amalgam"
Mark W. Abernathy.....Tacoma, Wash.

"Alloy Restorations"
W. J. Gibson.....Victoria, B. C.

"Method for Indirect Inlays"
C. T. Fleetwood.....Seattle, Wash.

Group Clinics

California Study Club

"Gold Foil Operations"
Chair
W. E. Gammans.....Alameda, Calif.
R. W. Rule, Sr.....Piedmont, Calif.
Franklin H. Locke.....Oakland, Calif.
Table
Kenneth Millican.....Oakland, Calif.
R. W. Rule, Jr.....San Francisco, Calif.
Susan L. Locke.....Oakland, Calif.

Portland Dental Study Club

"Gold Foil Operations"
Chair
John C. Bartels.....Portland, Ore.
Thomas S. Dulin.....Portland, Ore.
Donald G. Hood.....Portland, Ore.
Table
William W. Geiger.....Portland, Ore.
Collister M. Wheeler.....Portland, Ore.
Arthur G. Rossman.....Portland, Ore.

Golden Gate Study Club

"Gold Foil Operations"
Chair
Cecil R. Smith.....Burlingame, Calif.
Harry A. True.....San Francisco, Calif.
E. Frank Inskipp...San Francisco, Calif.
Table
Walter L. Cuthbertson.....
.....San Francisco, Calif.
Jean P. Cantou.....San Francisco, Calif.
Earl D. Harrison.....Oakland, Calif.

Gold Foil Study Club

"Gold Foil Restorations in Different Classes of Cavities"

Chair

G. B. Baird, Director..Los Angeles, Calif.
J. C. Metcalf.....Alhambra, Calif.
Carl W. Adams...San Bernadino, Calif.
R. W. Bassett.....Los Angeles, Calif.

Table

R. D. Fisher.....Glendale, Calif.
K. I. Lewis.....Huntington Park, Calif.
Ross S. LeLansky.....Los Angeles, Calif.

Seattle Dental Study Club

"Gold Foil Clinic"

W. I. Ferrier Study Club..Seattle, Wash.
G. V. Black Study Club...Seattle, Wash.
Dental Arts Study Club...Seattle, Wash.
Northwest Dental Study Club.....
.....Seattle, Wash.

"Reconstructive Plastic and Oral Surgery"

Arthur E. Smith.....Los Angeles, Calif.

"Procaine Injections" (Demonstrating various injections on wet specimens, skulls and mandibles)

Roy F. West.....Seattle, Wash.

"Pathologic Specimens"

Carl D. Lucas.....Los Angeles, Calif.

"Intraseptal Alveolotomy (Mouth Preparation for Denture)"

O. T. Dean.....Seattle, Wash.

"Fractures of the Jaws and Methods of Treatment"

L. E. Hansen.....Seattle, Wash.

"Procaine—Cobefrin Anesthesia"

Richard H. Riethmuller.....
.....Los Angeles, Calif.

"Preoperative and Postoperative Consideration of Cysts"

Harry E. Straub.....Los Angeles, Calif.

"Removal of Ankylosed and Hypercementosed Roots, Especially Lower Molars, by Use of Chisels"

Charles S. Cowan.....Sacramento, Calif.

"Demonstrating Local Injections on Wet Specimens"

N. A. Lussier.....San Francisco, Calif.

"Surgical Aspects of Tooth Removal and Subsequent Preparation of Process and Overlying Tissue to Encourage Rapid Healing"

Harry W. Titus.....Eugene, Ore.

"Elastic Traction in Treatment of Fractures of the Jaw"

C. M. Woodward...,..Pasadena, Calif.
Roland A. Grubb.....Glendale, Calif.

Group Clinic

San Francisco City and County Hospital

"Mandibular Impacted Third Molars"

H. W. Sorensen....San Francisco, Calif.

"Fractures"

H. E. Miller.....San Francisco, Calif.

"Surgical Removal in Difficult Extractions"

Robert F. Thayer.....Oakland, Calif.

"Alveolectomy"

C. Dudley Gwinn..San Francisco, Calif.

"Plastic Surgery"

Albert D. Davis....San Francisco, Calif.

"Cysts"

S. B. Fontaine.....Oakland, Calif.

"Impacted Cuspids"

Sanford M. Moose..San Francisco, Calif.

"Treatment of Pulps in Vital and Pulpless Deciduous Teeth"

Mary Martin.....San Francisco, Calif.

"Broken Incisal Tips and Their Treatment"

Floyde E. Hogeboom..Los Angeles, Calif.

"Morphology of Deciduous Teeth with Special Reference to Cavity Preparation"

James Nuckolls.....San Francisco, Calif.

"Ethyl Chloride Anesthesia"

Edwin C. Randol...San Francisco, Calif.
Jack Abbott.....Berkeley, Calif.

Group Clinic

"Dollar Value of Preventive Dentistry; Mouth Hygiene Instruction"

Verne L. G. Wilt.....Los Angeles, Calif.

"Child Psychology"

Minnie M. S. Proctor..Los Angeles, Calif.

"Habit Breaking Devices"

Hetty E. Cook.....Alhambra, Calif.

"Preventive Orthodontics"

Clara Agnes Carbinier.....
.....Los Angeles, Calif.

"Periodic Recall Systems"

Hazel Merrick.....Los Angeles, Calif.

"Space Retainers"

M. Louise Jung.....Pasadena, Calif.

"Protecting the Dental Pulp"

Floride W. Finney...Los Angeles, Calif.

"Pits and Fissures"

Alvin N. McCauley..Los Angeles, Calif.

"Operative Procedures"

Elsie C. Schildwachter.....
.....Huntington Park, Calif.

"Adult Orthodontia Therapy"

E. F. Lussier.....San Francisco, Calif.

Group Clinic

"Strategy of Orthodontic Treatment and Appliances"
Spencer R. Atkinson....Pasadena, Calif.
John E. Taylor.....Hollywood, Calif.
Aldys J. Gray.....Los Angeles, Calif.
David W. McLean...Los Angeles, Calif.
Harvey M. Spears.....Santa Ana, Calif.
Bernice L. Barkelew....Riverside, Calif.
Walter J. Furie.....Long Beach, Calif.
Fred E. McIntosh....Los Angeles, Calif.
E. M. Johnston.....Riverside, Calif.
Ben L. Reese.....Los Angeles, Calif.

Chinatown, San Francisco.

Group Clinic

"Diagnosis, Treatment and Retention of Class II, Division 1 Malocclusion"
George W. Hahn.....Berkeley, Calif.
Glenn Terwilliger.....Oakland, Calif.
Kenneth F. Terwilliger.....
.....San Francisco, Calif.
George H. Grover..San Francisco, Calif.
Ernest M. Setzer.....Oakland, Calif.
L. A. Huberty.....Berkeley, Calif.

Group Clinic

"Construction of Deciduous and Permanent Molar Bands"
Allen E. Scott.....San Francisco, Calif.

"Orthodontic Models of Interest to the General Practitioner"
Frederick Wolfsohn.San Francisco, Calif.

"Improved Lock for Lingual Arches"
Thomas R. Sweet.....Oakland, Calif.

"Photographic Facial Reproduction"
W. G. Sheffer.....San Jose, Calif.

"Some Fundamentals of Clinical Photography"
Frederick W. Schubert.....
.....San Francisco, Calif.

Group Clinic

"New Technic of Applied Dental Nutrition"
Harold F. Hawkins..Los Angeles, Calif.
Frederick A. Bricker.Los Angeles, Calif.
Robert T. Craig....Baldwin Park, Calif.
Michael Walsh (technician).....
.....Los Angeles, Calif.

"Clinical Periodontia: Three Accepted Methods of Treatment"
Arthur W. Lufkin.....Hollywood, Calif.

"Periodontoclasia"
Maxwell M. Dixon...Los Angeles, Calif.

"Periodontia—Care of the Mouth After Treatment"
M. Monte Bettman.....Portland, Ore.

Group Clinic

California Academy of Periodontology

"Instrumentation and Scaling"
John McKay.....Oakland, Calif.
R. B. Wright.....Oakland, Calif.
Lowell N. Peterson..San Francisco, Calif.

"Diagnosis and Classification"
W. C. Fleming.....Oakland, Calif.

"Medication"
Philip S. Haley.....San Francisco, Calif.

"Hygiene and Brushing"
Robert E. Newton...San Francisco, Calif.

"Surgical Measures"
A. W. Ward.....San Francisco, Calif.

"Bone Pathology"
Hermann Becks....San Francisco, Calif.
Nina Simmonds....San Francisco, Calif.

Group Clinic

San Quentin Prison Clinic

"Health Variations in Relation to Paradental Infection"
John P. O'Brien....San Francisco, Calif.
Carl F. Mills.....Concord, Calif.
Forrest L. Horner.....Berkeley, Calif.
Paul J. Boyens.....San Francisco, Calif.
Robert H. Reid.....San Francisco, Calif.

Edward J. Lattig...San Francisco, Calif.
Edgar L. Dow, Jr.....Oakland, Calif.
Robert J. Seeliger.....Oakland, Calif.
William F. Upton...San Quentin, Calif.
George L. Delagnes.San Francisco, Calif.
Leland E. Carter...San Francisco, Calif.
L. L. Walsh.....San Rafael, Calif.
Alexander G. Bartlett (M.D.).....
.....San Francisco, Calif.
George F. Oviedo (M.D.).....
.....San Francisco, Calif.
Charles F. Sweigert (M.D.).....
.....San Francisco, Calif.
Max Polse (M.D.)..San Francisco, Calif.
Abelson Epstein (M.D.).....
.....San Francisco, Calif.
I. C. Gobar (M.D.).San Francisco, Calif.
H. G. Marquez (M.D.).....
.....San Francisco, Calif.
Albert J. Schwarz (M.D.).....
.....San Francisco, Calif.

"Roentgenographic Aspects of Pathologic Lesions of Teeth and Paradentium"
William B. Ryder, Jr.....
.....San Francisco, Calif.

"Operative Radiodontia"
Walter S. Thompson.Los Angeles, Calif.

"Pharmacologic Demonstration of Local Anesthetics"
M. L. Tainter (M.D.).....
.....San Francisco, Calif.
A. H. Throndson...San Francisco, Calif.

"Mercury Evolution as a Possible Source of Poisoning in the Preparation of Amalgams"
John S. Shell.....San Francisco, Calif.

"Variables in Silicate Cement Fillings"
Joseph V. Mitchell.San Francisco, Calif.

"Recent Advances in Dental Anesthesia"
Chauncey D. Leake.San Francisco, Calif.

"Practical Helps for the Busy Dentist"
Carey H. Jenkins.....Hood River, Ore.

"Salivary Calcium and Phosphorus"
William Ward Wainwright.....
.....San Francisco, Calif.

"Models of Organic Molecules"
Ingo Hackh.....San Francisco, Calif.

"Porcelain Inlay"
George W. Cowden.San Francisco, Calif.

"Porcelain Inlays, Crowns, Bridges and Abutments"
D. D. Fisher.....Portland, Ore.

"Porcelain Inlays Supported by Gold, Restoring Incisal Angles and Proximal Surfaces of the Anterior Teeth"
Charles E. Burt.....Los Angeles, Calif.

"Porcelain Inlay Impression Technic, Making Models and Baking"
A. J. Brock.....Portland, Ore.

"Porcelain Step Clinic"
Alfred P. Watson.....Portland, Ore.

Group Clinic

"Dental Ceramics as Applied to Jacket Crowns and Inlays, Including the Broken Incisal Tip"
C. O. McBean.....Los Angeles, Calif.
George W. McDavitt.....
.....Los Angeles, Calif.
W. R. Irwin.....Los Angeles, Calif.
William A. Peschelt.Beverly Hills, Calif.

Group Clinic

"Gnathologic Research: Methods and Results"

Division I

"Maxillary-Mandibular Relations" (Demonstration on patients to show records and transfer to instrument)
Charles E. Stuart.....Ventura, Calif.
Lynn Wightman.....Los Angeles, Calif.
Donald MacQueen...Los Angeles, Calif.
Angus G. Hobbs.....Los Angeles, Calif.

Division II

"Control of Resilient Tissues Under Partial and Full Dentures"
Earl J. Thee.....Los Angeles, Calif.
Leon A. Gilmor.....Los Angeles, Calif.
G. D. Montgomery...Los Angeles, Calif.
Joseph J. Engholm.....Pasadena, Calif.
Frank A. Williams.....Pasadena, Calif.

Division III

"Articulation of Human Teeth (A Study of What It Means and How It Is Obtained)"
Harry V. Holcomb...Los Angeles, Calif.
James M. Chess.....Los Angeles, Calif.
J. Eugene Ziegler....Los Angeles, Calif.
Harvey Stallard.....San Diego, Calif.

California Study Club

"Gold Foil"
Royce Bishop.....Berkeley, Calif.
Clyde J. Bresnan.....Lodi, Calif.
Martin C. Guttman.San Francisco, Calif.
William C. Helfrich.....Oakland, Calif.

"Rebasing Technic"
Walter A. Brown.....Pomona, Calif.

"Immediate Denture Restoration with Partial Alveolectomy"
James W. Carson....Los Angeles, Calif.

"Original Impression Technic for Partial Denture Construction and Fixed and Removable Bridges"
Paul J. Ward.....San Francisco, Calif.

Group Clinic

"Simplified Full Denture Construction"
Northern California Prosthetic Club

"Construction of Cast Metal Trays and Method of Outlining Models"

"Technic for Upper Impression"

"Technic for Lower Impression"

"Boxing Impressions"

"Primary Bite"

"Secondary Bite with Relator Plates in Place"

"'Trubite' Articulator and Its Recordings"
Fred W. Burlingame.....
.....San Francisco, Calif.
Carl G. Buechele.....Oakland, Calif.
Wesley B. Clay.....Oakland, Calif.
C. Earl Clement.....Oakland, Calif.
Frank J. DeBorba.....Oakland, Calif.
Benjamin V. Deitch.San Francisco, Calif.
Wallace W. Greenlaw...Oakland, Calif.
Herbert E. Garcia.....Oakland, Calif.
George M. Grisamore...Oakland, Calif.
Frank L. Hart.....San Francisco, Calif.
Lester A. High.....Oakland, Calif.
C. F. Jarvis.....Oakland, Calif.
Philip H. Levin....San Francisco, Calif.
Wilfred H. Robinson....Oakland, Calif.
John B. Snell.....Vallejo, Calif.

"Mesial Application of Fulcrum in Extraction of First and Second Molars"
F. L. Householder.....Riverside, Calif.

"Appliances and Methods of Wiring Used in the United States and in Europe for the Correction of Simple Mandibular Fractures"
Erwin W. Ferber...San Francisco, Calif.

"Unilateral Fracture of the Maxilla—One Method of Treatment to Restore Function"
A. F. Procter.....The Dalles, Ore.

"Visibility in Oral Surgery"
Joseph B. Jenkins....Los Angeles, Calif.

"Postextraction Lesions"
Paul H. Hamilton.....Pasadena, Calif.
James B. Tarver.....Los Angeles, Calif.

"Castings for Deciduous Teeth and Their Indications"
Douglass W. Dyer...Los Angeles, Calif.

"Space Maintenance"
Jack F. McMath.....Oakland, Calif.
Carl N. Dorman.....Sacramento, Calif.

"Combination of Chrome Alloy and Precious Metal Orthodontic Appliances for Efficiency and Convenience"
John R. McCoy.....Los Angeles, Calif.

"Orthodontic Cases" (Pictorial exhibit)
L. R. Sattler.....Los Angeles, Calif.

"Porcelain Reconstruction"
A. E. Sykes.....Oakland, Calif.

"Visibility in Dentistry—Illumination and Transillumination"
A. Lawrence Dunn.Santa Barbara, Calif.

"Useful Dental Drugs"
Geoffrey F. Collins...Los Angeles, Calif.
D. J. Brown.....Los Angeles, Calif.

"Close Bite Technic"
Y. Kikuchi.....Los Angeles, Calif.

Group Clinic

"Simplified Method of Securing Functional Occlusion in Fixed Bridgework"
N. J. Anderson.....Los Angeles, Calif.
P. B. Bird.....Los Angeles, Calif.
L. E. Pittman.....Long Beach, Calif.

"Application of Os-Scalpella in the Surgical Removal of Difficult Teeth"
L. L. Bosworth.....San Diego, Calif.

Group Clinic

"Heat: An Important Factor in Casting Procedure"
Angelo D'Amico.....Stockton, Calif.
C. L. Daingerfield.....Stockton, Calif.
J. R. Jordan.....Stockton, Calif.

"Pyorrhea Surgery for the General Practitioner"
Albert E. Sanders....Los Angeles, Calif.

Group Clinic

"Theory and Creation of Angle Edgewise Appliance"
By George C. Chuck..Long Beach, Calif.

"Assembly and Installation of Angle Edgewise Appliance"
By M. C. Lasher.....Hollywood, Calif.

"Manipulation and Use of Angle Edgewise Appliance"
By Cecil C. Steiner...Los Angeles, Calif.

"Results of Treatment with the Edgewise Arch Mechanism"
Charles H. Tweed.....Phoenix, Ariz.

"Full Denture Construction" (Motion picture)
Bertram H. Downs.....
.....Colorado Springs, Colo.

"Uses for Cast Silver in Children's Dentistry"
Benjamin Kletzky.....Denver, Colo.

"Facial Prosthesis, with Special Reference to Reconstruction of Lost or Deformed Portions of the Face"
Everette A. Peterson.....Denver, Colo.

"Method of Diagnosing and Treating Cases Requiring Repositioning of the Mandible and Rebuilding of Occlusal Surfaces of the Teeth"
E. E. Bailey.....Denver, Colo.

"Diagnostic Factors in Chronic Vincent's Infection"
J. Leo Loftus.....Hartford, Conn.

"Difficult Extractions: Preoperative and Postoperative Care and Sequelae"
C. A. Yarbrough.....Macon, Ga.

"Removal of Broken Needle from Mandibular Pterygoid Region"
Frank F. McAtee.....Twin Falls, Idaho

"Treatment of Acute Infections About the Mouth and Jaws"
Emil L. Aison.....Chicago, Ill.

"Temporary Anterior Bridge for Accident Cases"
G. L. Teall.....Hiawatha, Kan.

"Full Denture Technic"
R. A. Denman.....Beloit, Kan.

"Modern Amalgam Technic"
E. E. Ramsey.....Topeka, Kan.

"Precision Removable Bridge Attachments"
E. E. Welch.....Topeka, Kan.

"Electroplating and Its Application to Inlay Dies"
L. M. Fleish.....Topeka, Kan.

"Reinforced Amalgam"
H. C. Holmes.....Wichita, Kan.

"Obtaining and Retaining Centric Occlusion"
A. B. Coffin.....Hutchinson, Kan.

"Unbalanced Forces"
T. N. Robertson.....Coffeyville, Kan.

"Block Anesthesia"
C. N. Mertz.....Topeka, Kan.

"Surgical Pyorrhea"
G. E. Weight.....Wichita, Kan.

American Dental Assistants Association

"Amalgam"
Alabama Dental Assistants Association

"Roentgen-Ray Technic"
Alameda County Dental Assistants Association

"Surgical Assistance"
Wisconsin State Dental Assistants Association
Chicago Dental Assistants Association
Peoria Dental Assistants Association

"Dental Assistant's Rôle in Electroforming Technic"
Detroit Dental Assistants Society

"Taking Pains"
Minnesota Dental Hygienists and Assistants Association

"Assistant's Rôle in Modern Die Making"
Pittsburgh Dental Assistants Association

"Care of Handpiece"
Tennessee State Dental Assistants Association

Individual Clinics

"Positive Control of the Effects of Forces of Mastication in Three-Quarter Crown Construction. A New Principle and Its Technic"
Walter E. Jones.....St. Paul, Minn.

"Accurate Balanced and Functional Occlusion with Plain Line Articulator"
F. S. Meyer.....Minneapolis, Minn.

"Oral Surgery"
R. W. Edwards.....Kansas City, Mo.

"Stress-Breaker Attachments"
W. H. Jordan.....Kansas City, Mo.

"Fractures of the Mandible"
W. J. Winterhoff.....St. Louis, Mo.

"Full and Partial Dentures"
W. W. Cloyd.....Livingston, Mont.

"Use of the Edgewise Arch in Orthodontics"
E. W. Tucker.....Butte, Mont.

"Periodontia"
A. S. Chichester.....Great Falls, Mont.

"Oral Pathology"
F. W. Webster.....Lincoln, Nebr.

"Tissue Changes in the Dental Pulp, Following Pulp Capping with Medicated Cements"
W. Clyde Davis.....Lincoln, Nebr.

"Roentgenographic Interpretation of Developing Dentition"
Arlo M. Dunn.....Omaha, Nebr.

"Immunization to Dental Caries with Silver Nitrate"
James Mark Prime.....Omaha, Nebr.

"Immediate Temporary Bridge"
Ralph L. Ireland.....Lincoln, Nebr.

"Porcelain Clinic"
Carlisle C. Bastian.....New York City

"Exodontia"
M. H. Feldman.....New York City

"Porcelain Restorations"
William A. Spring.....New York City

"Practical Hints to the General Practitioner"
C. Raymond Wells.....Brooklyn, N.Y.

"Maxillary and Mandibular Fractures; Anesthetic Agents for Various Conditions" (Lantern slides and photographs)
Philip R. Courten.....Jamaica, N. Y.

"Removable Appliances to Aid in the Correction of Malocclusion in the Mandibular Arch"
Herbert H. Ernst...Kew Gardens, N. Y.

"Anesthesia for Cavity Preparation and Pulp Removal"
Fred R. Adams.....New York City

"Impression Technic for Inlays"
Joseph A. Burgun.....Brooklyn, N. Y.

"Fractures of the Mandible"
William D. Lanier, Jr.....Oteen, N. C.

"Harelip and Cleft Palate Surgery"
Edward Reiter.....Cleveland, Ohio

"Practical Suggestions on Inlay Construction"
C. H. Scheu.....Lakewood, Ohio

"Conserving Teeth and Practice with the Roentgen Rays"
M. Lee Tarno.....Erie, Pa.

"Custodian of the Smile" (Illustrated by clinical photographs)
Fred D. Miller.....Altoona, Pa.

"Cases of Interest to the General Practitioner"
Franz William Stumpf.....
.....San Antonio, Texas

"Impressions for Immediate Dentures"
Dan C. Peavy.....Cuero, Texas

"Impressions for Full and Partial Dentures"
E. S. Park.....Jacksonville, Texas

"Amalgam Technic"
R. F. McCasland.....Tulia, Texas

"Full Denture Impression Technic"
Homer Simpson.....Dallas, Texas

Group Clinic

"Functional Occlusion in Full Dentures"
F. W. Hinds.....Dallas, Texas
T. H. Kennedy.....Dallas, Texas

"Impacted Third Molars"
W. S. Paine.....Salt Lake City, Utah

"Simplified Technic for Full Denture Construction for the Average Dentist"
W. S. Moyes.....Ogden, Utah

"One-Piece Casting for Bridgework"
E. B. Thatcher.....Ogden, Utah

Group Clinic

Dental health exhibit
Public Relations and Health Committee, Utah State Dental Association
D. L. Folsom.....Salt Lake City, Utah
W. R. Worley.....Salt Lake City, Utah
T. Fred Hardy.....Salt Lake City, Utah
Bruce P. McBride...Salt Lake City, Utah
William H. Sprunt..Salt Lake City, Utah
Carl M. Decker.....Salt Lake City, Utah

"Three-Quarter Crowns and Metal Casts in Fixed Bridge Construction"
P. L. Chevalier.....Richmond, Va.

"Exodontia and Oral Surgery"
Edward L. Thompson.....
.....Daytona Beach, Fla.

"Advanced Full Denture Technic"
Ewell Neil.....Nashville, Tenn.

"Types of Fixed Bridge Abutments That Have Stood the Test of Time"
T. E. Braly.....Chattanooga, Tenn.

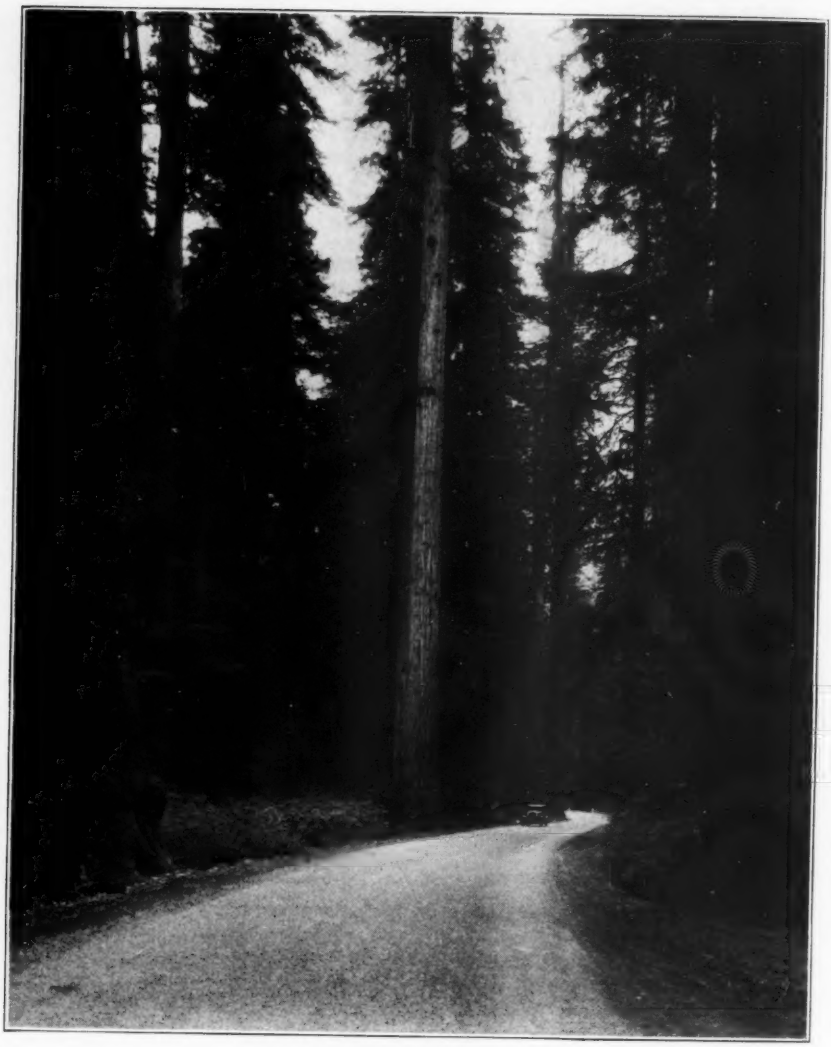
"Detection and Correction of Occlusal Trauma"
L. A. Neil.....El Paso, Texas

"Beading of Upper Palatal Bars in Partial Denture Construction"
L. D. Pankey.....Coral Gables, Fla.

"Construction of Porcelain Faced Crowns as Individual Prostheses and Bridge Abutments"
Curtis C. Later.....Detroit, Mich.

"Correcting Occlusal Deficiencies"
Ray Edward Ramaker..Missoula, Mont.

"Preparation, Manipulation and Subsequent Care of Synthetic Porcelain Fillings"
George A. Clipner.....St. Louis, Mo.



Giant redwoods of California.

THE SAN FRANCISCO SESSION

RADIO PROGRAM

Tuesday, July 14

Station KRE, "Present Trend of Dentistry"
Albert L. Midgley.....Providence, R. I.

Station KGGC, "Giving the Children a Better Chance"
E. L. Pettibone.....Cleveland, Ohio

Station KFRC, "Progress of American Dentistry in the Past Fifty Years"
C. N. Johnson.....Chicago, Ill.

Station KLS, "Your Child's Teeth"
George E. Morgan.....Milwaukee, Wis.

Station KLX, "Way to Better Health and Happiness for Children"
F. Denton White....Minneapolis, Minn.

Station KSFO, "Behind the Dentist"
Edward Reiter.....Cleveland, Ohio

Station KJBS, "Things a Public Should Know About Lesions and Infections of the Mouth. Their Danger and Relation to Disease and Their Significance to the Health of the Public"
T. A. Hardgrove.....Fond du Lac, Wis.

Station KPO and KGO, "There Are No Dental Emergencies"
John T. Hanks.....New York City

Wednesday, July 15

Station KRE, "Pink Toothbrush"
William R. Davis.....Lansing, Mich.

Station KGGC, "Three C's of Mouth Health"
Richard C. Leonard.....Baltimore, Md.

Station KFRC, "Preventing Dental Caries"
Walter T. McFall.....Atlanta, Ga.

Station KLS, "Development of Modern Dentistry"
Fred B. Olds.....Los Angeles, Calif.

Station KLX, "Dental Needs of American Childhood"
Floyde E. Hogeboom.Los Angeles, Calif.

Station KSFO, "Prayer to the Rain God"
Lon W. Morrey.....Chicago, Ill.

Station KJBS, "Are You Sweet Tooth Wise?"
Hazel Merrick.....Los Angeles, Calif.

Station KPO & KGO, "What Every Wearer of Dentures Should Know"
Charles Lane.....Detroit, Mich.

Thursday, July 16

Station KRE, "Prevention of Pyorrhea"
M. Monte Bettman.....Portland, Ore.

Station KGGC, "Teeth and Their Relation to Facial Features"
O. W. Brandhorst.....St. Louis, Mo.

Station KFRC, "Must We Have Decayed Teeth?"
E. H. Bruening.....Omaha, Nebr.

Station KLS, "Dentistry as an Aid to Restoring the Natural Appearance and Normal Hearing Through the Correction of Closed Bites"
E. E. Bailey.....Denver, Colo.

Station KLX, "Children's Bridgework as Preventive of Crooked Teeth"
Leonard Kohn.....New York City

Station KSFO, "Strange Dental Customs Around the World"
Peter J. Warren.....Cleveland, Ohio

Station KJBS, "Your Dentist, a Family Friend"
E. E. Graham.....Chicago, Ill.

Station KPO and KGO, "Why Be Concerned About Your Mouth?"
B. B. McCollum.....Los Angeles, Calif.

LUNCHEON CLUB PROGRAM

Tuesday, July 14—12:15 p.m.

Rotary Club of San Francisco, Palace Hotel
Boyd S. Gardner.....Rochester, Minn.

Wednesday, July 15—12:15 p.m.

Advertising Club of San Francisco, Palace Hotel
Arthur H. Merritt.....New York City

Exchange Club of Oakland, Oakland Hotel, Oakland, Calif.
Arthur C. Wherry..Salt Lake City, Utah

Thursday, July 16—7:30 a.m.

Lake Merritt Breakfast Club, Lake Merritt Hotel, Oakland, Calif.
Walter T. McFall.....Atlanta, Ga.

Kiwanis Club of San Francisco, Fairmont Hotel
J. Ben Robinson.....Baltimore, Md.

WOMEN'S PROGRAM

Monday, July 13

1:15 p.m. Excursion on San Francisco Bay: A three-hour trip which will permit a close view of the world's two largest bridges, description to be given by engineers, who will

also point out the various points of interest such as the harbor, Alcatraz Island and the Golden Gate). Women and men invited. Boat leaves from the Key Route Pier at the Ferry Building. Secure tickets on registration (limited to 1,250).

9:00 p.m. Cosmopolitan Night: A combination dance and pageant in which the spirit of San Francisco will be depicted, held at the Palace Hotel in the Palm Court, the Pied Piper Room, the Rose Room and the Concert Room. A buffer supper will be served. Dancing begins at 9:00 p.m. and the pageant at 10:00 p.m. Secure tickets on registration.

Tuesday, July 14

9:30 a.m. First General Meeting of the American Dental Association, in the Colonial Ballroom of the Hotel St. Francis.

2:00 p.m. Tour of San Francisco: Leaving the Auditorium promptly at 2:00 p.m., this trip will include Golden Gate Park, the beach, the Presidio, Fishermen's Wharf, Telegraph Hill, the Embarcadero, with its ships from all parts of the world, old Mission Dolores and San Francisco's beautiful residential district. Admission by ticket only, limited to 500 (women).

2:00 p.m. Visit to the Japanese Tea Garden in Golden Gate Park, where tea will be served in native style and entertainment will be furnished through the courtesy of the Japanese dentists from San Francisco. This tour will also comprise a visit to the Palace of the Legion of Honor, where a concert will be given. This tour is limited to 400 (women), with admission by ticket only.

7:45 p.m. Second General Meeting of the American Dental Association, in the Colonial Ballroom of the Hotel St. Francis.

Wednesday, July 15

1:00 p.m. Women's luncheon and fashion show at the Mark Hopkins Hotel on Nob Hill. The show will be put on by the Emporium, one of San Francisco's leading stores. Luncheon tickets, $1.25 each, can be procured in the lobby of the Hotel St. Francis, or at the Auditorium.

5:15 p.m. Night in Chinatown: At 5:15 p.m., a typical Chinese dinner, comprising the most delectable dishes of the Orient, will be served especially for our members in the leading Chinese restaurants. Tickets, $1.00. (Procure in advance at the Auditorium.) A tour of Chinatown with Chinese guides will start from Old St. Mary's Church, Dupont and California Sts., at 7:00 p.m. This tour will include a visit to the famous Chinese Theatre, where a Chinese play will be in progress, joss houses, Chinese stores and other points of interest in the largest Chinese town outside of China. Only 1,000 can be accommodated on these tours, in groups of forty.

9:00 p.m. A parade depicting the glamour of the Orient will be staged by the Chinese. Native costumes, native bands, native dances, including the famous Lion's dance, will be a part of the pageant. At the close of this festivity, an open street dance with music by a Chinese orchestra will be held. Admission by ticket only.

Thursday, July 16

1:15 p.m. Boat ride on San Francisco Bay for those unable to go Monday.

2:00 p.m. Tour of the city, repeated for the benefit of the women who were unable to go on Tuesday.

8:00 p.m. President's Ball in Mural Room of the Hotel St. Francis (in honor of George B. Winter, retiring President). An attractive floor show will mark this event. A special dinner prepared by one of the world's leading chefs will be featured. Limited to 600. Tickets, $2.50 each.

Friday, July 17

12:20 p.m. East Bay Day, given by the Alameda County Dental Society and Ladies Auxiliary. This will com-

prise an automobile ride through Oakland, Alameda and Berkeley, where the University of California and the Greek Theatre are situated. Leave San Francisco on the 12:20 Key Route Boat and take the Twelfth Street electric train to the Oakland Civic Auditorium, where the party will be met. At the end of the tour, tea will be served at the Women's Athletic Club on the shores of Lake Merritt. Reservations not later than Thursday noon.

HEALTH AND SCIENTIFIC EXHIBITS

Exhibitors:

1. Charles F. Deatherage, Department of Public Health, Springfield, Ill.
2. Clella McCullough, Department of Health, Bakersfield, Calif.
3. Hazel Merrick, Los Angeles, Calif.
4. Department of Public Health, Santa Barbara, Calif., Floy A. Turner.
5. National Congress of P.-T. A., Washington, D. C.
6. American Dental Assistants Association, Ruth Rogers, Detroit, Mich.
7. Department of Public Instruction, Helen M. Baukin, Honolulu, Hawaii.
8. S. M. Gordon, Council on Dental Therapeutics, A.D.A., Chicago, Ill.
9. University of California Dental School (California Medical Center), San Francisco, Calif.
10. Northwestern University School of Dentistry, J. R. Schumaker, Chicago, Ill.
11. National Formulary Committee, American Pharmaceutical Association, Chicago, Ill.
12. American Medical Association, Chicago, Ill.
13. University of California, College of Pharmacy, San Francisco, Calif.
14. California Dairy Council, San Francisco, Calif.
15. U. S. Food & Drug Administration, San Francisco, Calif.
16. Southern California Orthodontia Study Club, Pasadena, Calif. (Spencer R. Atkinson).
17. American Dental Hygienists' Association, H. Fitzgerald, Berkeley, Calif.
18. Jesse Carr (M.D.), University of California Hospital, San Francisco, Calif.
19. Army Medical Museum, Frank P. Stone, Surgeon-General Office, Washington, D. C.
20. American Society for Control of Cancer, New York City.
21. University of California Extension Division, Boyd Rakestraw, 301 California Hall, Berkeley Campus, Berkeley, Calif.
22. Hooper Research Foundation, Karl Meyer, San Francisco, Calif.
23. San Francisco P.-T.A., Mrs. Joseph Morcombe, San Francisco, Calif.
24. Visiting Nurses Association, 1636 Bush Street, San Francisco, Calif.
25. V. P. Blair, St. Louis, Mo.
26. California State Department of Health, San Francisco, Calif.
27. San Francisco County Nurses, San Francisco, Calif.
28. Isador Hirschfeld, New York City.
29. Research Commission, American Dental Association, C. T. Messner, Washington, D. C.
30. Bureau of Public Relations, American Dental Association, Chicago, Ill.
31. College of Physicians & Surgeons, School of Dentistry, San Francisco, Calif.
32. University of Louisville, College of Dentistry, Louisville, Ky.

ANNOUNCEMENTS

PAST PRESIDENTS' (A.D.A.) CLUB LUNCHEON

The Past Presidents' Club of the American Dental Association will hold its annual luncheon at 12:30, Monday, July 13, Room 218, St. Francis Hotel. The annual address will be delivered by Thomas B. Hartzell. Every Past President in attendance at the San Francisco meeting is urgently requested to be present at this luncheon.

HOMER C. BROWN, *Secretary*,
Columbus, Ohio.

AMERICAN ACADEMY OF RESTORATIVE DENTISTRY

The American Academy of Restorative Dentistry will meet in the Gothic room of the Sir Francis Drake Hotel, San Francisco, on July 11-12.

A. F. SCHOPPER, *Secretary*,
Kansas City, Mo.

AMERICAN ACADEMY OF PERIODONTOLOGY

The American Academy of Periodontology will hold its Twenty-Third Annual Meeting at the Palace Hotel, San Francisco, July 9-11. All members of the American Dental Association who are interested in the field of periodontia are cordially invited to attend this meeting.

C. H. GRACEY, *Secretary,*
Detroit, Mich.

AMERICAN ASSOCIATION OF DENTAL EDITORS

The Sixth Annual Meeting of the American Association of Dental Editors will be held in the St. Francis Hotel, Room 261, July 11, with morning, afternoon and evening sessions.

O. W. BRANDHORST, *Secretary,*
St. Louis, Mo.

AMERICAN COLLEGE OF DENTISTS

The American College of Dentists will hold its annual convocation at the St. Francis Hotel, San Francisco, July 12, with morning, afternoon and evening sessions. The meeting will be held in the Colonial Ballroom; luncheon, Cafe Lounge; banquet, Colonial Ballroom.

O. W. BRANDHORST, *Secretary,*
St. Louis, Mo.

AMERICAN SOCIETY OF ORAL SURGEONS AND EXODONTISTS

The Eighteenth Annual Meeting of the American Society of Oral Surgeons and Exodontists will be held at the Sir Francis Drake Hotel, San Francisco, July 10-11.

HARRY BEAR, *Secretary,*
Richmond, Va.

ASSOCIATION OF AMERICAN WOMEN DENTISTS

The Association of American Women Dentists will meet July 13 at the St. Francis Hotel, San Francisco, with a business meeting in Room 210 and banquet in Parlor I.

E. PEARLE BISHOP, *President,*
Denver, Colo.

ASSOCIATION OF MILITARY DENTAL SURGEONS OF THE UNITED STATES

The Twenty-Third Annual Meeting of the Association of Military Dental Surgeons will be held in the Italian Room, St. Francis Hotel, San Francisco, on the evening of Wednesday, July 15. There will be a dinner, followed by a business meeting. Members and former members are urged to attend.

W. D. VAIL, *Secretary,*
Washington, D. C.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS

The annual meeting of the National Association of Dental Examiners will be held July 11-12, at the St. Francis Hotel, San Francisco, with the meeting in Parlor 2 and luncheon in the Italian Room.

R. P. THOMAS, *Secretary,*
Louisville, Ky.

AMERICAN SOCIETY FOR THE PROMOTION OF CHILDREN'S DENTISTRY

The American Society for the Promotion of Children's Dentistry will meet in the St. Francis Hotel, San Francisco, July 13, with the meeting in Parlor 2 and luncheon in the Italian Room.

AMERICAN DENTAL GOLF ASSOCIATION

Registration for golf will be held July 12. The Calcutta Pool will be held in the Italian Room, St. Francis Hotel, and Prize Dinner (July 14) in Room 220.

AMERICAN DENTAL TRAPSHOOTERS' LEAGUE

The American Dental Trapshooters' League will meet in San Francisco, July 13, at 1:30 p.m. The place of the shoot will be announced later. The shoot this year is being arranged so that all trapshooters will have an equal chance at the prizes. The hundred bird event will be shot in the form of a mixed target race. The first fifty targets being shot from 16 yards; the second fifty from a handicap based on the scores of the first fifty. Prizes will be given for the first fifty; the second fifty, and the total 100. There will also be skeet shooting. There will be a stag dinner following the shoot. Definite announcements will be made in the official program.

Every dentist showing his 1936 A.D.A. card is eligible to shoot.

HARRY ALLSHOUSE, JR., *National Secretary,*
Kansas City, Mo.

STATE SOCIETY OFFICERS' CONFERENCE

The State Society Officers' Conference will be held at the St. Francis Hotel, San Francisco, Sunday, July 12, in Room 220, with registration at 9:00 a.m. All state society officers are invited to be present.

AMERICAN DENTAL HYGIENISTS' ASSOCIATION

The Thirteenth Annual meeting of the American Dental Hygienists' Association will be held in the William Taylor Hotel, San Francisco, July 13-17.

AMERICAN DENTAL ASSISTANTS ASSOCIATION

The Twelfth Annual Meeting of the American Dental Assistants Association will be held at San Francisco, July 13-17. Headquarters will be at the Hotel Whitcomb.

LUCILE S. HODGE, *General Secretary,*
401 Medical Arts Bldg.,
Knoxville, Tenn.

RESEARCH COMMISSION

The Research Commission of the American Dental Association will meet in Room 212 of the St. Francis Hotel, San Francisco, for an executive board session, Friday, July 10, at 11 a.m.; Saturday, July 11, 11 a.m., and Sunday, July 12, 10 a.m. The entire commission will meet in Room 210, Tuesday, July 14, at 9 a.m., and Thursday, July 16, at 6 p.m.

C. T. MESSNER, *Secretary,*
Washington, D. C.

ANNUAL MOUTH HYGIENE LUNCHEON

The Annual American Dental Association Mouth Hygiene Luncheon will be held at the St. Francis Hotel in the Italian Room on Wednesday, July 15, at 12:15 p.m.; speaker Walter T. McFall, Atlanta, Ga. Tickets, $1.25.

E. L. PETTIBONE, *Chairman,*
Cleveland, Ohio.

ANNUAL BREAKFAST CONFERENCE OF STATE DIRECTORS AND MOUTH HYGIENE WORKERS

The annual breakfast of the state directors and mouth hygiene workers will be held at the St. Francis Hotel, Room 218, at 8:00 a.m., Tuesday and Wednesday, July 14-15. Those interested in teaching dental health are urged by the Committee on Dental Health Education to attend.

E. L. PETTIBONE, *Chairman,*
Cleveland, Ohio.

INTERNATIONAL ASSOCIATION FOR DENTAL RESEARCH

The International Association for Dental Research will meet July 13, at the St. Francis Hotel, for luncheon in Room 220.

COLLEGE OF PHYSICIANS AND SURGEONS ALUMNI LUNCHEON

The College of Physicians and Surgeons Alumni Luncheon will be held at the Palace Hotel, July 14.

HOUSE OF DELEGATES LUNCHEON

The California State Dental Association will be hosts of the members of the House of Delegates, July 14, at a luncheon in the Mural Room, St. Francis Hotel.

UNIVERSITY OF CALIFORNIA ALUMNI LUNCHEON

The University of California Alumni Luncheon will be held July 14 at the Sir Francis Drake Hotel.

XI PSI PHI

The Xi Psi Phi Fraternity will meet July 13; annual banquet, 6:30 p.m., Sir Francis Drake Hotel.

PSI OMEGA NATIONAL ALUMNI CHAPTER

Psi Omega headquarters, during the meeting of the American Dental Association, will be the Palace Hotel, San Francisco. All visiting brothers are requested to register on arrival at the Psi Omega headquarters. The annual banquet of the National Alumni Chapter will be held at the Palace Hotel, July 13, at 6:30 p.m.

BISSELL B. PALMER, *Grand Master,*
667 Madison Avenue,
New York City.

DELTA SIGMA DELTA

The Fifty-Second Annual Meeting of the Supreme Chapter of Delta Sigma Delta Fraternity will be held in the Mark Hopkins Hotel, San Francisco, Monday, July 13. The first session will be held at 9:30 a.m., followed by the usual complimentary luncheon to members. The annual banquet will take place at 6:00 p.m. in the same hotel, to which the

women will be invited. When registering for the banquet, it will be necessary to present membership cards to the committee in charge. Hotel reservations should be made as soon as possible by those members expecting to attend the meeting, and such requests should be sent to Don J. Aubertine, 291 Geary Street, San Francisco, Calif.

By Order of the Supreme Council.

WILLIAM C. SMOLENSKE,
Supreme Grand Master.

ALPHA OMEGA

The official headquarters of the Alpha Omega Fraternity will be maintained at the Clift Hotel. All fraters attending the annual meeting of the American Dental Association are requested to register at headquarters and attend the dinner on the evening set aside for fraternity functions. Inquiries should be addressed to Lloyd I. Lasky, 450 Sutter Street, San Francisco, Calif.

By order of the Supreme Chancellor.

ALVIN H. BERMAN,
Supreme Scribe.

OMICRON KAPPA UPSILON

Omicron Kappa Upsilon Fraternity will meet July 14 for luncheon in Parlor I, Hotel St. Francis.

UNIVERSITY OF PENNSYLVANIA ALUMNI ASSOCIATION

University of Pennsylvania Alumni Association Luncheon will be held Tuesday, July 14, at 12:30 p.m., at the Whitcomb Hotel. Write John D. Milliken, 490 Post Street, San Francisco, for reservations.

PACIFIC COAST SOCIETY OF PROSTHODONTISTS; JOINT MEETING

The Pacific Coast Society of Prosthodontists will meet at the Clift Hotel, July 10-12. There will be a joint meeting of the society and the National Society of Denture Prosthodontists and the American Full Denture Society, July 11, at the Clift Hotel.

INTERNATIONAL COLLEGE OF DENTISTS

The International College of Dentists will meet in Banquet Room 302, Sir Francis Drake Hotel, Sunday, July 12, at 6:30 p.m.

AMERICAN SOCIETY FOR THE PROMOTION OF ORAL DIAGNOSIS

The American Society for the Promotion of Oral Diagnosis will meet July 13, in Room 222, Hotel St. Francis.

RAILROAD RATES TO SAN FRANCISCO

No Certificates Necessary

Low summer excursion rates will be in effect from all parts of the United States and Canada with a return limit to Oct. 31, 1936.

EXAMPLES OF ROUND TRIP RATES WHICH WILL APPLY

From	To San Francisco *1st Class*	*Intermediate*	*Coach*
Chicago	$86.00	$68.80	$57.35
Minneapolis	86.00	68.80	57.35
New Orleans	85.15	68.15	56.80
Omaha	72.00	57.60	48.00

Consult your home ticket agent for detailed information regarding fares, routes, stopovers and attractions.

AMERICAN DENTAL ASSOCIATION

San Francisco, Calif. July 13-17, 1936.

HOTEL RESERVATION

In securing hotel reservations for the 1936 Session, consult the hotel rate sheet and fill out the blank application below. Mail immediately to the hotel you wish to patronize. The hotel will then advise you of the reservation that they make for you.

In case your first choice cannot be made, please indicate second and third choices. If none of your choices are available, the hotel manager will mail your application to the chairman of the Halls & Hotels Committee and he will place your reservation in as favorable a hotel as possible.

Please remember that a reservation constitutes a contract with the hotel to provide you with the accommodations you desire. If you find it impossible to carry out your part of the contract, namely, to occupy the room at the time agreed on, write or wire the hotel, releasing it, in order that your room may be available for other members.

MAIL THIS APPLICATION DIRECT TO THE HOTEL

HOTEL RESERVATION

AMERICAN DENTAL ASSOCIATION, SAN FRANCISCO, CALIF., JULY 13-17, 1936.

.....Hotel.
San Francisco, Calif.
Please reserve sleeping accommodations as noted below:

.....Room(s) With bath for.....persons. Rate desired $.....

.....Room(s) Without bath for.....persons. Rate desired $.....

Third choice hotel..... Second choice hotel.....

ROOMS TO BE OCCUPIED BY:	ADDRESS IN FULL
Applicant.....	.....
.....	.....
.....	.....
.....	.....

Please confirm this reservation to applicant. I further agree to notify the hotel at once in the event I am unable to use this reservation.

IMPORTANT TO HOTEL MANAGER: In the event you cannot accept this reservation, please forward this application at once to C. W. Johnson, Chairman, Hall & Hotels Committee, 1160 Flood Bldg., San Francisco, Calif., who will attend to the assignment of this reservation.

HOTEL	WITH BATH		
	One Person	Two Persons	Twin Beds
ALEXANDER HAMILTON 613 O'Farrell St.			$6.50 Apts.
AMBASSADOR HOTEL Mason & Eddy Sts.	$2.50	$3.50	4.50
BRAYTON 50 Turk St.	2.00	2.50–3.00	3.50
CALIFORNIAN 405 Taylor St.	3.00	4.00	5.00
CLARK 217 Eddy St.	2.50–3.00	3.00	3.50
CLIFT Geary at Taylor St.	3.50	5.00	5.00–6.00–7.00 8.00–9.00
EL CORTEZ 550 Geary St.	3.00–3.50 4.00	4.50	5.00–6.00
FAIRMONT HOTEL California & Mason Sts.	3.50–4.00 5.00–6.00	5.00–6.00 7.00	6.00–8.00 10.00
FIELDING Geary & Mason Sts.		3.00	3.50
GAYLORD 620 Jones St.	2.50–3.00	3.50–4.00	4.00–5.00
HERBERT'S 151 Powell St.	1.50*	2.50*	
HOTEL BELLEVUE Geary & Taylor Sts.	2.50–3.00 3.50	3.50–4.00 4.50	4.50
HOTEL CANTERBURY 750 Sutter St.	3.00–3.50	4.50–5.50	4.50–5.50
HOTEL FRANCISCAN 350 Geary St.	2.50	3.50–4.00	4.50
HOTEL MANX 225 Powell St.	2.50	3.50–4.00	
HOTEL MAURICE 761 Post St.	3.00–3.50	4.50–5.50	5.50–6.50
HOTEL SENATOR 519 Ellis St.	2.00	2.50	3.00

*Without Bath Only.

HOTEL	WITH BATH		
	One Person	Two Persons	Twin Beds
HOTEL STEWART 353 Geary St.	2.50–3.00 3.50	4.00–4.50 5.00	4.00–4.50 5.00
HOTEL UTICA 333 Fulton St.	2.00–2.50	2.50–3.00	3.50–4.00
KING GEORGE 334 Mason St.		3.00–4.00	
MARK HOPKINS 999 California St.	4.00–5.00 6.00–7.00	6.00–7.00 8.00	7.00–8.00 9.00–10.00
MARYLAND 490 Geary St.	2.50	3.00	
OLYMPIC HOTEL 230 Eddy St.	2.50	3.50	4.00
OXFORD Mason & Turk Sts.		3.00	4.00
PALACE Market & New Montgomery Sts.	3.00–3.50–4.00 5.00–6.00	5.00–6.00 7.00	6.00–7.00 8.00
PLAZA 310 Post St.	2.00	3.00–3.50 4.00	4.50–5.00
PICKWICK 5th & Mission Sts.	2.50–3.00	3.50–4.00	4.50–5.00
RAMONA 174 Ellis St.		3.00	4.00
ST. FRANCIS Powell & Geary Sts.	3.50–4.00 5.00–6.00	5.00–6.00 7.00–8.00	6.00–7.00 8.00–10.00
SHAW 1112 Market St.	2.50	3.50	4.00
SIR FRANCIS DRAKE Sutter & Powell Sts.	3.00–3.50 4.00–5.00	5.00–6.00 7.00	6.00–7.00 8.00–9.00
SPAULDING 240 O'Farrell St.	2.00	3.00	
WHITCOMB 1231 Market St.	2.00–2.50–3.00 3.50–4.00	3.00–3.50 4.00	4.00–4.50 5.00–6.00
WILLIAM TAYLOR 100 McAllister St.	2.50–3.00 3.50	3.50–4.00	4.00–5.00 6.00

Ferry Building, San Francisco.

DIRECTORY OF COMMERCIAL EXHIBITORS

Abbott Laboratories, North Chicago, Ill.
American Cabinet Co., Two Rivers, Wis.
American Hecolite Denture Corp., Portland, Ore.
Ames Co., The W. V-B., Fremont, Ohio
Antidolor Mfg. Co., Inc., New York City
Austenal Laboratories, Inc., Chicago, Ill.

Bakelite Dental Products, Inc., New York City
Baker & Co., Newark, N. J.
Bard-Parker Co., Inc., Danbury, Conn.
Boos Dental Laboratories, Henry P., Minneapolis, Minn.
Buffalo Dental Mfg. Co., Buffalo, N. Y.
Burton Mfg. Co., Inc., Chicago, Ill.
Butler Co., John O., Chicago, Ill.

Castle Co., Wilmot, Rochester, N. Y.
Caulk Co., The L. D., Milford, Del.
Chicago X-Ray Film & Mount Co., Chicago, Ill.
Church & Dwight Co., Inc., New York City
Clayton Mfg. Co., Alhambra, Calif.
Cleveland Dental Mfg. Co., Cleveland, Ohio
Coe Laboratories, Inc., Chicago, Ill.
Columbia Dental & X-Ray Corp., New York City
Columbus Dental Mfg. Co., Columbus, Ohio
Cook Laboratories, Inc., New York City
Corega Chemical Co., Inc., Cleveland, Ohio
Crescent Dental Mfg. Co., Chicago, Ill.

Dee & Co., Thomas J., Chicago, Ill.
Dental Plastics Co., Los Angeles, Calif.
Dentists' Supply Co., New York City
Detroit Dental Mfg. Co., Detroit, Mich.
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Davis, J. H., First National Bank Bldg., Salt Lake City

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Stansbery, C. J., Medical & Dental Bldg., Seattle

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CURRENT LITERATURE

Carcinoma of Tongue in Newborn Child (L. W. Frank, C. D. Enfield and A. J. Miller, Am. J. Cancer, 26:775 [April] 1936): A new born child presented a pea size swelling on the left side of the tongue. The lesion seemed to enlarge and a biopsy made on the eleventh day after birth was reported as revealing papillary squamous-cell carcinoma. The growth was widely excised on the fourteenth day and the area was cauterized. Sections taken from the excised mass were again diagnosed as of squamous cell carcinoma. As a precaution against possible metastasis, roentgen-ray treatments were given over the neck nodes on the twenty-second day and again in six weeks. There was no evidence of metastasis two years later.

HAMILTON ROBINSON.

Radiologic Investigation of the Maxillary Antrum (E. H. Shannon, J.A.M.A., 106: 599 [Feb. 22] 1936): The value of the roentgenologic examination of the maxillary antrum in cases of suspected pathosis is emphasized and diagnostic points, with the so-called plain roentgen-ray film, are discussed. It is noted that infections of dental origin most frequently follow extractions "with curettage of the socket and consequent removal of the protective zone of inflammatory reaction around infected roots." The curet may actually perforate the antrum floor and infected material may be directly introduced, as well as occasional root tips. An artefact suggesting a heaping up of the antral mucoperiosteum may result from the presence of unerupted teeth in the posterior part of the maxilla. Correlation of roentgen and operative observations in a large series of cases shows very favorable results.

HAMILTON ROBINSON.

Epithelioma of Lip (C. B. Ward and A. Betts, Radiology, 26:349 [March] 1936): A total of 228 cases are discussed and well illustrated, and a method of treatment is given. The importance of careful checking of the teeth of the patient in routine examination is emphasized. Only 4 per cent of the cases were in women and no negroes were in the series. The author believes that it is safe to assume that there is some systemic cause for the frequent occurrence in white males. In recent years, women have been working outdoors and smoking is rapidly increasing among them, yet the percentage of epithelioma of the lip in women has not become greater. The immediate cause in a great majority of cases is a strictly localized, frequently repeated irritation, usually of dental origin. The removal of this source of irritation is part of the treatment. A few cases are due to some form of irritation affecting the entire mouth. Good dental care is emphasized as playing an important rôle in preventing epithelioma of the lip.

J. FRANK HALL.

Relation of Physical Defects to the Physical Growth of Children in Different Regions of the United States. Physical Measurement Studies, No. 4 (M. Gofafer, Am. J. Hygiene, 23:205 [March] 1936): This paper reports a consideration of the influence of geographic location on the effect of physical growth, rate of growth and body form of elementary school children. Physical measurements include body weight, standing and sitting height, chest circumference, transverse and anteroposterior chest diameter and vital capacity. Physical defects include carious teeth, defective tonsils and adenoids, goiter, enlarged cervical and submaxillary glands and defective vision. Material for study came from records of about 25,000 white native-born elementary school children in the northeast, north central and south central United States. Almost one-half of the children had one or more defects. (The author concludes caries was probably called a defect only if discoverable without mouth mirrors and explorers, for only about one third of the children were recorded as having carious teeth.) On the average, the defective group of each region is lighter and shorter and has shorter trunks and less vital capacity than the group that is free from defects There

was no evidence that differences in geographic location of children with recorded defects influenced their physical growth or rate of physical growth. M. K. HINE.

Morphologic Characteristics of Sinuses (J. J. Shea, Arch. Otolaryngol., 23:484 [April] 1936): The author traces the development of the sinuses, and points out conditions that determine their size and shape. The sinuses of a child will assume the shape of the sinuses of the ancestor whom he resembles in facial appearance, provided neither has suffered an arrest of development of the sinuses. The relation of the deciduous and permanent teeth to the maxillary sinus is discussed and the fact is pointed out that, as the sinus develops downward and backward, the upper molars are rotated into the alveolar process. The author points out that an arrest of development at this period would delay the eruption of the upper third molar, and is the most important factor in failure of the third molars to erupt. Any surgical operation in the canine fossa of the maxillary sinus of a child may injure or destroy future teeth. The author concludes that a comprehensive knowledge of the normal development of the sinuses is valuable in differential diagnosis of sinusitis and its treatment. M. K. HINE.

Glossodynia: Reflex Irritation from Mandibular Joint as Principal Etiologic Factor; Study of Ten Cases (J. B. Costen, Arch. Otolaryngol., 22:554 [Nov.] 1935): The literature on glossodynia is reviewed. The author reports ten cases out of ninety cases with neuralgia and aural symptoms. The pathologic condition of the temporomandibular joint may be due to lack of molar support in an edentulous mouth or uneven pressure permitted by malocclusion of the natural teeth. In most cases, the pain was relieved by repositioning of the jaws to increase its vertical dimension and to bring the condyle out of range of the auriculotemporal and chorda tympani nerves. The symptoms described by the author as a mandibular joint syndrome are impairment of hearing, tinnitus, dizziness, headache in the vertex and occiput and around the ears and burning sensations of the nose, throat and sides of the tongue. J. FRANK HALL.

The Blood in Arthritis (E. F. Hartung, J. S. Dans, O. Steinbrocher and Margaret Staub, J.A.M.A., 106:1448 [April 25] 1936): Most blood analyses in arthritic cases made in the usual routine have been found normal. In this study, a simplification of Schilling's modification of the Arneth count has been utilized. The polymorphonuclear neutrophils are divided into two groups, nonfilamented (young) and filamented. Careful studies of serum calcium, cholesterol content of plasma and serum protein were also made. The opinion that rheumatoid arthritis is a disease of bacterial origin has, until recently, been based on clinical impressions. The authors report that their blood studies point to an infectious origin of rheumatoid arthritis, for they find an elevation of the nonfilamented polyneutrophil count, a lowered plasma cholesterol, a rise in serum globulin and a fall in the albumin fraction. Tests of the agglutinin content of serum suggests that streptococci may be etiologic agents in rheumatoid arthritis. Osteo-arthritis has long been considered a degenerative disease. The authors report normal percentages of nonfilamented polyneutrophils and other laboratory findings suggesting that infection plays no part in this condition. M. K. HINE.

Bell's Palsy (J.A.M.A., 106:133 [April 11] 1936): Norman Titus comments on the treatment of Bell's palsy. Of 337 cases referred to the Department of Physical Therapy at Vanderbilt Clinic of Columbia Presbyterian Medical Center, only 142 existing more than two weeks failed to respond to diathermy and the static wave current. Heat in the form of radiant light or mild diathermy, plus the "decongesting effect of the static wave current," is found to be sufficient to afford prompt relief. Prolonged treatment is necessary, and should be aided by massage and exercise. M. K. HINE.

FOREIGN LITERATURE

Indications for Surgery in Severe Bell's Palsy (A. Tumarkin, Brit. M. J., 3924:

580 [March 21] 1936): Permanent deformity after Bell's palsy is more common than is generally realized. Duel states that at least 20 per cent of patients do not recover completely. The author sent out a questionnaire to 133 patients. He received sixty-seven replies, of which only fifty-one related to true Bell's palsy. Of the fifty-one, only twenty-five admitted that the patients were completely cured. No doubt most of those who did not reply were cured. Recovery after decompression is a matter of days as compared to nonsurgical treatment, which prolongs the palsy for weeks or months. The results of operation for facial decompression is gratifying. It is not recommended as routine procedure in the early stages. J. FRANK HALL.

Alleged Occurrence of Acetylcholine and Adrenaline in Cat's Saliva (J. Secker, J. Pharm. & Exper. Therap., 56:464 [April] 1936): Commenting on a statement by Larsen (*J. Pharm. & Exper. Therap.*, 54:341, 1935) that he (Secker) claimed to have discovered adrenaline in saliva, the author points out that he made no such claim and that his experimental findings do not indicate such a finding. He had described an excitation of the vasoconstrictor mechanism or possibly of the suprarenal bodies on injection of saliva. A resemblance to acetylcholine noted in an earlier paper was later found to be only superficial and the depressor substance in saliva has not been identified.

HAMILTON ROBINSON.

Una nueva observacion de adamantinoma voluminosa del maxilar inferior (Large Ameloblastoma of Mandible) (T. Gioia, Semana med., 2:214, 1934; abstr. Am. J. Cancer, 26:644 [March] 1936): A case is reported occurring in a man of 64 years. Six years previously, a lower left molar had been broken off and the roots left in place. About three months after this, a painful swelling had appeared over the site and a quantity of fetid pus escaped after incision. A hard painless tumor appeared and grew steadily with intermittent discharge of pus. A roentgen-ray film taken at the time of admission revealed replacement of practically the entire left mandible by a spongy mass with clear cystic spaces. Half of the mandible was resected and a prosthesis inserted. Microscopically, a typical cystic ameloblastoma was presented, with columnar epithelium lining cystic spaces containing an amorphous, gelatinous material.

HAMILTON ROBINSON.

Liver Therapy in Agranulocytosis (Christoffersen and Pollack, Ugesk. f. Laeger, Jan. 16, 1936, p. 48; abstr. Brit. M. J.): Encouraging results are reported with intramuscular injections of liver extract in two cases of agranulocytosis in which there was a history of amidopyrine medication. The authors suggest that this treatment acts by stimulating the bone marrow and possibly also by generating pentnucleotide in the body. The mortality of agranulocytosis without treatment is about 90 per cent. It can be reduced 36 per cent by blood transfusions, 47 per cent by roentgen-ray therapy and 25 per cent by administration of nucleotide. Liver extract may effect a further reduction in the mortality. J. FRANK HALL.

Treatment of Leukemia (L. J. Witts and W. M. Levitt, Brit. M. J., 1:762 [April 11] 1936): The three main varieties of leukemia are: the acute, chronic myeloid and chronic lymphatic. Acute leukemia is usually fatal in a few weeks. Hemorrhage, infiltration of the tissues by leukemic deposits and intercurrent infection are the most obvious symptoms, and one can be easily mistaken unless the blood is examined. Necrotic ulceration of the mouth and gum tissues and enlarged tonsils are usually present. Surgical intervention about the oral cavity should strenuously be avoided, as it is likely to lead to fatal hemorrhage or infection. Irradiation is of little value except for relief of pain. Intravenous injection of neo-arsphenamine, administration of iron by mouth and injections of liver extract are helpful in prolonging the life of the patient. Transfusions may cause the symptoms to improve for a few days, but its effects are evanescent and only rarely does it do more than protract a painful situation.

J. FRANK HALL.

MISCELLANY

BOOK REVIEWS

Parenteral Therapy. A Ready Reference Manual of Extra-Oral Medication for Physicians, Dentists, Pharmacists, Chemists, Biologists, Nurses, Medical Students and Veterinarians. By Walton Forest Dutton, M.D., Formerly Medical Director, Polyclinic and Medico-Chirurgical Hospitals Graduate School of Medicine, University of Pennsylvania; Visiting Physician to the Northwest Texas Hospital; Visiting Physician to St. Anthony's Sanitarium; Director, Medical Research Laboratories, Amarillo, Texas; Colonel, Medical Officers' Reserve Corps, U. S. A., and George Burt Lake, M.D., Formerly Special Lecturer in Hygiene, Purdue University; Editor, Clinical Medicine and Surgery; Associate, American College of Physicians; Educational Lecturer, Illinois State Medical Association; Colonel, Medical Officers' Reserve Corps, U. S. A. Illustrated with 90 half-tones and line engravings. 376 pages. Price, $7.50. Published by Charles C. Thomas, Springfield, Ill., Baltimore, Md.

When it is considered that, in the very nature of things, the dentist is so frequently called on to administer drugs or remedies parenterally, it must be apparent that a treatise on the subject should appeal with especial force to members of the dental profession. By "parenteral therapy" is meant the introduction of remedies by other means than into the alimentary tract. The broad scope of the volume is indicated by the fact that various types of local anesthesia are discussed. These chapters are of especial interest to dentists.

The book deals technically with such subjects as the hypodermic syringe, as to suitable needles and other equipment. It considers the subject of blood transfusion and other procedures that, while they do not ordinarily come within the scope of the dentist, present for his consideration a fascinating picture of these interesting processes. A careful reading of this volume will well repay the dental practitioner in a general broadening of his point of view, and will open up many affiliated fields for his profitable study.

Cavity Preparation and Abutment Construction in Bridgework. A Treatise on the Fundamental Principles and the Technical Phases Governing the Cutting of Cavities or Preparations in Natural Teeth for Purposes of Anchorage; Impression Methods for Accurate Reproduction and the Construction of Inlays and Abutments in Accordance with Modern Successful Casting Procedures. By Jacob R. Schwartz, D.D.S., Brooklyn, N. Y. 482 illustrations by the author; 352 pages; price, $6.50. Published by Dental Items of Interest Publishing Co., Inc., Brooklyn, N. Y.

This volume is precisely what its title implies. It is not intended as a dissertation on crown and bridgework generally, nor does it deal essentially with the subject of cavity preparation. It really seeks to portray the anchorage of bridges through the medium of cavities cut for that purpose in abutment teeth. The principles of cavity preparation thus outlined, while somewhat stereotyped and conventional in design, are for the most part sound mechanically, and if carried out faithfully should bring about favorable results. A word of commendation should be given the publishers for the quality of the paper and the general character of the illustrations. The mechanical perfection of the printer's and engraver's art was seldom brought into play to better effect than in the making of this book.

NEWS

Louisiana Society Elects Officers: The following officers were elected at the Fifty-Sixth Annual Meeting of the Louisiana State Dental Society to serve for the year 1936-1937: president, Malcolm E. Kaffie, Shreveport; vice president, Louis P. Laville, Plaquemine; secretary, Julian S. Bernhard, Shreveport; treasurer, Oscar J. Ory, Garryville. New Orleans was selected as the meeting place for the 1937 convention.

Deaths

Blayney, Harold V., Alexis, Ill.; University of Illinois, College of Dentistry, 1928; died April 2; aged 32.

Breen, John M., New York City; New York College of Dentistry, 1899; died April 3.

Carlson, Theodore G., Baker, Ore.; North Pacific College of Oregon, 1922; died April 6; aged 53.

Deschler, George L., New York City; School of Dentistry, University of Pennsylvania, 1909; died April 3.

Fellows, R. L., La Grange, Ill.; Northwestern University Dental School, 1898; died April 11; aged 63.

Hawley, Howard Wildman, Danbury, Conn.; University of Maryland, School of Dentistry, 1905; died April 26.

Hillier, Cecil R., Pendleton, Ore.; North Pacific College of Oregon, 1916; died April 5; aged 44.

Keppler, Christian William, West Chicago, Ill.; Northwestern University Dental School, 1905; died April 10; aged 57.

Rittler, E. G.; Wayland, Iowa; College of Dentistry, University of Iowa, 1902; died March 9; aged 60.

Italian fishing fleet at anchor, San Francisco.

NATIONAL BOARD OF DENTAL EXAMINERS; SUCCESSFUL CANDIDATES, PARTS I & II*

Adair, William Virgil	Baltimore College of Dental Surgery
Alderson, Thomas Fredericks	Chicago College of Dental Surgery
Allis, Erwin F.	University of Minnesota
Aronson, Irving Jerome	Baltimore College of Dental Surgery
Barker, Kenneth A.	State University of Iowa
Barrows, Sydney C.	State University of Iowa
Beagle, Gordon A.	University of Pittsburgh
Beardsley, Rufus Ray	Chicago College of Dental Surgery
Beetham, William Allen	Baltimore College of Dental Surgery
Benson, Clifton Ernest	University of Pittsburgh
Bicket, Floyd Gilbert	Washington University
Black, John Aloysina, Jr.	Medical College of Virginia
Blitzstein, Edward	Atlanta-Southern Dental College
Bodine, Roy L.	State University of Iowa
Bohrman, Henry John	University of Louisville
Boris, Henry Langdon	Chicago College of Dental Surgery
Borland, Leonard Clifford	Chicago College of Dental Surgery
Brown, Orlo Kenneth	University of Louisville
Browning, Douglas Arthur	Baltimore College of Dental Surgery
Brudvik, Arthur B.	University of Minnesota
Caldwell, James Theodore	Baltimore College of Dental Surgery
Chotowski, Weslaw Henry	Tufts College Dental School
Cofrancesco, Richard E.	Baltimore College of Dental Surgery
Coroniti, Fred	University of Pittsburgh
Cramer, Esther	Temple University Dental School
Curtis, William Dwight	Washington University
deShazo, George Sydney	Georgetown University, Dental Department
Deutsch, Maurice	Chicago College of Dental Surgery
Dickson, William Alexander	University of Minnesota
Diefenbach, George B.	University of Louisville
Donelan, John James	Chicago College of Dental Surgery
Dorman, LaPorte V.	Texas Dental School
Dotolo, Fred Henry	Tufts College Dental School
Eccleston, William Edward	Georgetown University, Dental Department
Eggers, Warren W.	Chicago College of Dental Surgery
Eighme, Maurice Edward	Medical College of Virginia
Englander, Horace H.	Temple University
Fasbinder, Samuel M.	Kansas City-Western Dental College

*To May 1, 1936.

Fawcett, Joseph C.	University of Minnesota
Feldman, Joseph Edward	St. Louis University
Field, Morey	Temple University Dental School
Fifield, Frank Thomas	University of Minnesota
Fisher, Merrian Clark	State University of Iowa
Floria, Bruno Guido	Georgetown University, Dental Department
Franklin, Edward M.	Northwestern University
Gantner, Edwin A.	University of Denver
Gilman, Donald Orrin	University of Minnesota
Gilmour, Harold Thomas	Temple University, Dental School
Gladstone, Sydney Louis	University of Pittsburgh
Glover, Harvey H.	University of Pittsburgh
Goscicki, Gustav Stanley	Chicago College of Dental Surgery
Gruber, Maurice Deputy	State University of Iowa
Grunwald, Marshall Frederick	University of Illinois
Gulick, Floyd Boyles	Tufts College Dental School
Gyllenborg, Floyd G.	University of Minnesota
Harriman, Grant D.	Northwestern University
Hattenhauer, Milo B.	University of Illinois
Heckler, Harold G., D.D.S.	University of Minnesota
Heineman, Victor F.	Chicago College of Dental Surgery
Hohman, Daniel L.	University of Pittsburgh
Holmes, George Arthur	Chicago College of Dental Surgery
Hurme, Veikko Oscar	Tufts College Dental School
Johnston, Ralph Watson, D.D.S.	University of Minnesota
Josh, Ronald M.	Chicago College of Dental Surgery
Kaufman, Alexander	Medical College of Virginia
Kiviat, Jacob	Temple University
Kohout, John Joseph	Medical College of Virginia
Kopf, George Fred	Georgetown University, Dental Department
Lake, Samuel L.	University of Pittsburgh
Lathrop, Bennett Milan	University of Michigan
Lepeska, Francis Walter, D.D.S.	University of Minnesota
Lerner, Peter Alexander	Chicago College of Dental Surgery
Libman, Isadore Hyman	Chicago College of Dental Surgery
Liddell, George	University of Pittsburgh
Liguori, Sirio	Georgetown University
Lipinski, Wenceslaus	Chicago College of Dental Surgery
Lippold, Walter William	Chicago College of Dental Surgery
MacKenzie, Russell Charles	Marquette University
McParland, John Felix	University of Pittsburgh
Margaretten, Joel	University of Minnesota
Martin, James Merle	Northwestern University
Morrison, William D.	University of Louisville
Mosetich, Theodore Robert	Chicago College of Dental Surgery
Nemec, Andrew Francis	Chicago College of Dental Surgery
Nichols, Ray M.	Chicago College of Dental Surgery

Oken, Leo	Kansas City-Western Dental College
O'Loughlin, P. J.	University of Minnesota
Parker, Charles Ray	University of Pittsburgh
Parker, Theodore R.	Harvard University Dental School
Paul, John H.	State University of Iowa
Paulsen, John Max	University of Minnesota
Pennington, Jess A., Jr.	University of Pittsburgh
Peterson, Ralph Gilbert	University of Minnesota
Powell, Perry	State University of Iowa
Reger, Charles Kenneth	State University of Iowa
Reilly, Raymond Joseph	Medical College of Virginia
Reiss, Walter L.	Georgetown University
Ritchey, Beryl Thomas	University of Southern California
Rogers, Earl H.	University of Pittsburgh
Rydesgy, Stephen Michael	University of Pittsburgh
Rubin, Morris	Baltimore College of Dental Surgery
Rzeszotarski, Joseph Sigismund	Chicago College of Dental Surgery
Schmidt, Clarence Hugo	St. Louis University
Schott, Robert W.	State University of Iowa
Shaffer, William D.	State University of Iowa
Simpson, Richard Lee	Medical College of Virginia
Skinner, Merton Bryon	Chicago College of Dental Surgery
Slatniskne, Andrew	University of Pittsburgh
Smith, Stewart Edward	University of Pittsburgh
Smith, William George, Jr.	Georgetown University
Svoboda, John F.	Chicago College of Dental Surgery
Stetzer, John Jacob, Jr.	Temple University, Dental School
Stewart, Charles Griffin	University of Pittsburgh
Stupine, Albert I.	Temple University, Dental School
Styer, Sylvester A.	University of Pittsburgh
Succop, Robert M.	University of Pittsburgh
Sunnenblick, Martin	Tufts College Dental School
Taylor, Preston Reeves	Baltimore College of Dental Surgery
Thomas, David Waldo	Chicago College of Dental Surgery
Thompson, Charles Rupert	Creighton University
Thompson, Lester Wilson	Baltimore College of Dental Surgery
Truesdale, F. B.	University of Illinois
Turnquist, Herbert E.	University of Minnesota
Van Landeghen, Louis R.	Chicago College of Dental Surgery
Wehrle, Herbert A., Jr.	University of Pittsburgh
Wigdor, Leo B.	University of Pennsylvania
West, James M.	University of Pittsburgh
White, Wilfred Walter	University of Minnesota
Williams, Robert Edwin	Medical College of Virginia
Woycik, Peter W.	Georgetown University
Yount, John George	State University of Iowa
Zaslow, Louis P.	Kansas City-Western Dental College

SAN FRANCISCO—AND ROUNDABOUT

By SANFORD M. MOOSE,* D.D.S., San Francisco, Calif.

SAN FRANCISCO long since won its permanent place in the hearts of vacationists, both as one of the world's most thrilling cities and as one of the coolest summer resorts in America. This year finds the metropolis beside the Golden Gate offering all its usual attractions and charms plus several added ones of genuine interest to visitors who enjoy out-of-the-ordinary sights.

Although still unwilling to relinquish its older and altogether traditional charms, such as the tiny cable cars that climb up and down towered hills to give passengers a remarkably wide variety of panoramic views, San Francisco is advancing far and speedily in modern developments. For example, while persistently cherishing those street cars of a type long ago abandoned by most American communities, it is doing a lion's share in building simultaneously history's two greatest bridges, blazing new trails in engineering feats such as some other less daring municipalities might hesitate to essay.

As the 8¼-mile San Francisco-Oakland Bay bridge, the longest in the world, is to be finished by late this fall, and the Golden Gate bridge, with its record-breaking "longest single span of 4,200 feet," is due for completion next year, the construction work on them this spring and summer will be especially interesting and worth seeing. The unique methods employed in building these structures are said to be such as to make the constructive activities on them most spectacular.

Meanwhile, beckoning temptingly to Delegates to the Seventy-Eighth Annual Convention of the American Dental Association, July 13-17, are: San Francisco's Chinatown, the largest Chinese settlement outside of China, with its numerous Oriental allurements, including Tin How Temple, the oldest such place of worship in the United States; the Embarcadero, with its more than sixty modern piers and ships of the seven seas, and at one end of which is the world-famed Fishermen's Wharf, where sons of sunny Italy cook your lobsters or crabs right before you in huge cauldrons on the sidewalk; the Golden Gate Park, with its great De Young Museum, Academy of Sciences, Aquarium and a Japanese Tea Garden, the gift of an emperor, which takes you back to old Japan; and one of the nation's finest, most extensive all-year-'round ocean beaches, at one end of which are Seal Rocks, where countless sea-lions sun themselves daily, and at the other end of which is Fleischhacker's Zoo, where, in addition to a fine big collection of wild animals and birds, will be found the largest outdoor swimming pool on earth.

All this is merely skimming over a few highlights of things worthwhile in San Francisco. The night life is deserving of much comment, being of the gayest, as might be expected in such a mecca for cafes extraordinary, providing, as they do, the opportunity to "dine around the world." The shops, too, are worthy of much attention, a number of these mercantile establishments dating back to the gold-rush days of 1849.

Then, there is the Marina Yacht Harbor, accommodating 250 pleasure craft, and being the starting-place of thrilling and extensive sailing over the 450 square miles of San Francisco Bay. Close by is the Presidio, the largest of military reservations within a city, where San Francisco had its genesis, March 28, 1776, when Juan Bautista de

*Chairman, Committee on Publicity.

Anza raised the flag of Spain there. The city's oldest adobe building is still in use at the Presidio, being at present the Army Officers' Club. Of equal historic interest is the Mission Dolores, founded June 28, 1776. Adorning the gardens of this venerable spiritual center are roses of Castile that have been growing more than a century.

San Francisco is blessed in centering one of the country's greatest and most popular vacationlands: all northern and central California. Within little more than an hour's journey, via a trim ferry across the Golden Gate, is Mount Tamalpais, where may be gained new thrills in hiking to eminences from which may be had marine views and vistas landward never to be forgotten, and also where is situated a unique mountain theater, at which this season's outdoor play is to be George Bernard Shaw's "Androcles and the Lion." On the lower slopes of Mount Tamalpais is an inspiring outpost of the great Redwood Empire, known as Muir Woods, a national monument, where will be found some of the oldest and tallest trees in the world.

A three-hour trip southward takes one to the Paradise-like region around beautiful Monterey Bay. There will be enjoyed gay Del Monte, the social sporting center of California, where golf, polo and other popular sports are at their best always. Nearby is historic Monterey, the state's first capital, where will be found several interesting landmarks of the old Spanish and Mexican eras, including a customs house that was the first one on the Pacific coast. Intriguing Carmel-by-the-Sea, refuge of famous artists and writers, is only a short distance away.

Other points of exceptional interest easily reached from San Francisco, in addition to the incomparable redwood empire, with its side attractions of a petrified forest and the amazing geysers of Sonoma County, include:

Yosemite National Park, 1,176 square miles of endless scenic wonders, including several of the world's greatest waterfalls, and where one may indulge in every conceivable outdoor pastime.

Lassen Volcanic National Park, where will be found the only recently active volcano within the forty-eight states, and much inexplicable volcanic action of the strangest sort.

Mile-high Lake Tahoe, celebrated as "the lake of the sky," and undoubtedly one of the most gorgeous and remarkable inland bodies of water on earth.

Sequoia National Park, where, in one of the greatest groves of big trees, stands the General Sherman Tree, the largest and oldest thing living.

The old gold country, where the amazing rush of '49 centered, and which today is doubly interesting, because of the lure of no less than eighty-four ghost towns and the fact that gold-mining activities there are more extensive now than they have been for seventy-three years.

Even after seeing all the sights and enjoying all the varied pastimes available at the places listed here, one has not much more than started to see this California wonderland.

ANNOUNCEMENTS*

CALENDAR OF MEETINGS

American Dental Association, San Francisco, July 13-17.

American Academy of Periodontology, San Francisco, July 9-11.

American Association of Dental Editors, San Francisco, July 11.

American Academy of Restorative Dentistry, San Francisco, July 11-12.

American College of Dentists, San Francisco, July 12.

American Society for the Promotion of Dentistry for Children, San Francisco, July 13-14.

American Society of Oral Surgeons and Exodontists, San Francisco, July 10-11.

Association of American Women Dentists, San Francisco, July 13-17.

American Dental Society of Europe, August, 1937.

Greater New York Meeting, December 7-11.

International Association for Dental Research (San Francisco Section), San Francisco, July 13.

International Dental Congress, Vienna, August 2-8.

Texas-Oklahoma-Dallas County, Dallas, August 31-September 4.

Society for the Advancement of General Anesthesia in Dentistry, New York City, third Monday in February, April, October and December.

District of Columbia at George Washington University, Washington, D. C., second and fourth Tuesdays in each month from October to June, inclusive.

British Empire Dental Meeting, London, July.

Montreal Dental Club Fall Clinic, Montreal, October 14-16.

American Dental Hygienists' Association, San Francisco, July 13-17.

American Dental Assistants Association, San Francisco, July 13-17.

New England Health Education Association, Cambridge, Mass., June 5-6.

STATE SOCIETIES

June

Idaho, at Pocatello (1-3)

Maine, at Portland (26-27)

Missouri, at St. Louis (8-10)

New Hampshire, at Sunapee (29-30)

July

Colorado, at Denver (6-9)

Wyoming, at Sheridan (13-14)

August

Texas, at Dallas (31-September 4)

September

Southern California, at Los Angeles (21-23)

October

Florida, at Orlando (5-7)

November

Puerto Rico, at Mayaguez

STATE BOARDS OF DENTAL EXAMINERS

Alabama, at Birmingham, June 29. E. W. Patton, Comer Bldg., Birmingham, Secretary.

Arizona, at Flagstaff, August 3. R. A. McCall, 719 Professional Bldg., Phoenix, Secretary.

Arkansas, at Little Rock, June 15-18. Clarence W. Koch, Donaghey Bldg., Little Rock.

California, at Los Angeles, June 15, and at San Francisco, May 25. Kenneth I. Nesbitt, 450 McAllister St., San Francisco, Secretary.

Colorado, June 23-27. David J. Tepley, 807 Republic Bldg., Denver, Secretary.

Connecticut, at Hartford, June 23-27. Almond J. Cutting, Southington, Recorder.

Delaware, June 17-18. Charles R. Jefferis, Wilmington, Secretary.

Florida, at Jacksonville, June 22-26. H. B. Pattishall, 351 St. James Bldg., Jacksonville, Secretary.

*Announcements must be received by the fifth day of the month in order to be published in the forthcoming issue of THE JOURNAL.

Georgia, at Atlanta, June 8. R. C. Coleman, Atlanta, Secretary.

Indiana, at Indianapolis, June 16-19. J. M. Hale, Mt. Vernon, Secretary.

Kentucky, June 5-8. Robert L. Sprau, 970 Baxter Ave., Louisville, Secretary.

Louisiana, at New Orleans, June 10-13. Joseph L. Webre, New Orleans, Secretary.

Maine, at Augusta, June 22-24. Alton H. Swett, 192 State St., Portland, Secretary.

Massachusetts, at Boston, June 10-13. Francis M. Cahill, 141 State House, Secretary.

Minnesota, at Minneapolis, June 19-25. Paul Hagen, Crookston, Secretary.

Mississippi, at Jackson, June 16. T. Ford Leggett, Laurel, Secretary.

Montana, at Helena, June 29-July 2. Leonard A. Jenkin, 214 Medical Arts Bldg., Great Falls, Secretary.

Nebraska, at Lincoln and Omaha, June 15-20. Mrs. Clara Perkins, Lincoln, Director.

New Jersey, June 29-July 4. John C. Forsyth, 148 W. State St., Trenton, Secretary.

New Jersey, at Trenton, December 7-12. State Board of Registration and Examination in Dentistry, 148 W. State St., Trenton.

New Mexico, at Albuquerque, June 22-24. J. J. Clarke, Artesia, Secretary.

North Dakota, at Fargo, July 14-17. W. E. Cole, Bismarck, Secretary.

Ohio, at Columbus, June 22. Morton H. Jones, 1553½ North Fourth St., Columbus, Secretary.

Pennsylvania, at Philadelphia and Pittsburgh, June 16-20. W. A. McCready, Highland Bldg., Harrisburg, Secretary.

South Carolina, at Columbia, June 15-17. David Aiken, Winnsboro Bank Bldg., Winnsboro, Secretary.

South Dakota, at Sioux Falls, June 22-25. H. C. Whitney, Wessington Springs, Secretary.

Tennessee, at Memphis, June 8. B. C. Gallimore, Commercial Bank Bldg., McKenzie, Secretary.

Texas, at Houston, June 15-18. R. T. Weber, Norwood Bldg., Austin, Secretary.

Utah, at Salt Lake City, June 29-July 3. S. W. Golding, Salt Lake City, Director.

Vermont, at Montpelier, June 29-July 1. H. B. Small, Burlington, Secretary.

Virginia, at Richmond, June 9. John M. Hughes, Medical Arts Bldg., Richmond, Secretary.

West Virginia, June 29-July 1. Henry C. Hill, 804 Quarrier St., Charleston, Secretary.

Wisconsin, at Milwaukee, June 22-26. S. F. Donavan, Tomah, Secretary.

COLORADO STATE BOARD OF DENTAL EXAMINERS

The next examination of the Colorado State Board of Dental Examiners will be held in Denver, June 23-27. Applications for license must be filed at least fifteen days prior to the date of examination. For applications and further information, address DAVID J. TEPLEY, *Secretary*, 807 Republic Bldg., Denver.

GEORGIA STATE BOARD OF DENTAL EXAMINERS

The Georgia State Board of Dental Examiners will hold the next examination at the State Capitol, Atlanta, June 8.

R. C. COLEMAN, *Secretary*,
Atlanta.

MONTANA STATE BOARD OF DENTAL EXAMINERS

The next examination of applicants to practice dentistry or dental hygiene in the State of Montana will be given at Helena, June 29-July 2.

LEONARD A. JENKIN, *Secretary*,
214 Medical Arts Bldg.,
Great Falls.

STATE OF UTAH DEPARTMENT OF REGISTRATION

The next Utah State Dental examination will be held June 29-July 3 at the Department of Registration, 326 State Capitol, Salt Lake City. Applications must be in this office ten days before the date of the examination.

S. W. GOLDING, *Director*,
Salt Lake City.

GREATER NEW YORK DECEMBER MEETING

The twelfth Greater New York December Meeting will be held December 7-11 at the Hotel Pennsylvania, New York City.

GEORGE C. DOUGLASS, *Chairman,*
Press & Publication,
106A Hotel Pennsylvania,
New York City.

TEXAS STATE DENTAL SOCIETY

The fifty-sixth annual convention of the Texas State Dental Society will be held in Dallas, August 31-September 4, in conjunction with the Texas Centennial Exposition. For additional information, address

J. G. FIFE, *Secretary,*
Medical Arts Bldg.,
Dallas.

NOTICE TO DENTISTS AND DENTAL HYGIENISTS CONNECTED WITH ORPHANAGES

At the Seventy-Eighth Annual Session of the American Dental Association to be held in San Francisco, July 13-17, those giving dental service to orphanages will form an organization, to pool experiences, discuss methods and formulate plans for statistical, operative and nutritional studies. The rapidly growing tendency to use orphanages for dental research gives staff dentists the unusual opportunity of making important and necessary contributions. Those interested are asked to bring to the meeting any data on studies they have made, as well as charts and record keeping systems having special advantages. Further information will be furnished on application.

CHARLOTTE S. GREENHOOD,
450 Sutter Bldg.,
San Francisco, Calif.

AMERICAN DENTAL ASSOCIATION SEVENTY-EIGHTH ANNUAL CONVENTION NAVY DAY

All active and reserve dental officers of the United States Navy attending the Seventy-Eighth Annual Session of the American Dental Association, San Francisco, July 13-17, are invited to a luncheon and sightseeing trip to the U. S. Receiving Ship on Yerba Buena Island in San Francisco Bay, Monday, July 13. Boats will leave Pier 14 in San Francisco at 10:30 a.m. This trip will afford an unusual opportunity of viewing the San Francisco-Oakland Bay Bridge during its construction; a bird's-eye view of the reclamation project for the San Francisco World's Fair, and a visit to the battleships that will be in the harbor at that time. Those desiring to attend please notify Lieut.-Com. Edward B. Howell, (DC), U. S. Navy, U. S. Receiving Ship, San Francisco, Calif.

INSTITUTE ON DENTAL HEALTH EDUCATION

The University of California College of Dentistry will conduct an Institute on Dental Health Education at the Medical Center Campus, Parnassus and Third Avenues, San Francisco, July 9-11. The program will include lectures and round table discussions by guest speakers and members of the faculty of the university on subjects of interest to dental hygienists and dentists who are concerned with health education and public health. No charge will be made to those who attend the institute. For further information and a program, address the Dean of the College of Dentistry, University of California, Medical Center Campus, San Francisco, Calif.

NEW JERSEY STATE BOARD OF REGISTRATION AND EXAMINATION

The State Board of Registration and Examination in Dentistry of New Jersey will hold its annual examinations, commencing December 7 and continuing for five days thereafter. On application to the secretary, a copy of the requirements and rules, instruction sheet and preliminary application blank will be sent. Any person desiring to apply as a candidate must file the preliminary application, together with the examination fee of $25, on or before September 1.

State Board of Registration and
Examination in Dentistry of
New Jersey,
148 West State St.,
Trenton.

RECENT BOOKS WORTH BORROWING* OR BUYING† from the LIBRARY BUREAU of the AMERICAN DENTAL ASSOCIATION

212 E. Superior St., Chicago, Ill.

Adams, C. W.	Your teeth and their care. St. Louis, Mosby, 1932. $1.25.
	Alfred David Lenz system of lost wax casting. New York, National Sculpture Soc., 1933. $2.00.
American Assn. Dental Schools	Course of study in dentistry. Chicago, Amer. Assn. Dental Schools, 1935. $1.00 Paper, $1.50 Cloth.
American Dental Assn., Council on Dental Therapeutics	Accepted dental remedies. Chicago, American Dental Assn., 1935.$1.00.
American Medical Assn., Council on Pharmacy & Chemistry	Glandular physiology and therapy. Chicago, Amer. Med. Assn., 1935. $2.50.
American Medical Assn., Council on Pharmacy & Chemistry	New and nonofficial remedies, 1935. Chicago, Amer. Med. Assn., 1935. $1.50.
American Pharmaceutical Assn., Committee on National Formulary	National formulary. Washington, D. C., Amer. Pharmaceutical Assn., 1935. $5.00.
American Pharmaceutical Assn.	Pharmaceutical recipe book. Baltimore, Amer. Pharmaceutical Assn., 1929. $5.00.
Anderson, G. M.	Orthodontic laboratory manual. St. Louis, Mosby, 1930. $2.00.
Anthony, L. P.	Dental terminology. Chicago, American Dental Assn., 1930. (Out of print.)
Appleton, J. L. T., Jr.	Bacterial infection with special reference to dental practice. Philadelphia, Lea & Febiger, 1933. $7.00.
Appleton, J. L. T., Jr., & Bryant, C. K.	Laboratory guide in bacteriology. Philadelphia, Lea & Febiger, 1928. $2.75.
Asgis, A. J.	Outline of dental socio-economics. New York, Allied Dental Council, 1934. $1.00.
Bartels, H. A.	Outline of bacteriology. New York, W. A. Broder, 1929. $2.00.
Bartlett, L. W., & Neel, Mildred B.	Compensations in the professions. New York, Association Press, 1933. $2.00.
Beck, Dorothy F.	Cost of equipping a dental office. Chicago, University of Chicago Press, 1932. $1.00.
Berger, Adolph	Principles and technique of oral surgery. Brooklyn, N. Y., Dental Items of Interest, 1927. $7.00.
Berger, Adolph	Principles and technique of the removal of teeth. Brooklyn, N. Y., Dental Items of Interest, 1929. $7.50.
Beust, T. B.	Dental histology and embryology. Philadelphia, Saunders, 1934. $3.00.
Blayney, J. R.	Dental pharmacology and therapeutics. St. Louis, Mosby, 1934. $4.50.
Blunt, Katherine, & Cowan, Ruth	Ultraviolet light and vitamin D in nutrition. Chicago, University of Chicago Press, 1930. $2.50.
Bödecker, C. F.	Elementary histology for dental hygienists. New York, W. A. Broder, 1929. $2.00.

*Books may be *borrowed* by members of the Association for a period of one week after date of receipt; and if not reserved for some one else, the period will be extended on request. A deposit of $2.00 for each volume to be sent at one time should accompany all requests for books. This will be refunded on return of books.

†If you wish to *purchase* books, indicate plainly which books you desire and enclose check with order. A list of package libraries will be sent free on request.

Bogert, L. J.	Nutrition and physical fitness. Philadelphia, Saunders, 1935. $3.00.
Bosworth, H. J.	Dental economics. Chicago, Bosworth Economic Institute, 1932. $3.00.
Bowler, Inez	Elementary manual of dental library practice. Ann Arbor, Univ. of Michigan Press, 1932. $1.50.
Box, H. K.	Necrotic gingivitis. Toronto, University of Toronto Press, 1930. $1.25.
Box, H. K.	Treatment of the periodontal pocket. Toronto, University of Toronto Press, 1928. $1.25. (Out of print)
Bregstein, S. J.	Business conduct of an ethical practice. Brooklyn, N. Y., Dental Items of Interest, 1932. $4.00.
Bridges, M. A.	Dietetics for the clinician. Philadelphia, Lea & Febiger, 1935. $10.00.
Broderick, F. W.	Principles of dental medicine: the medical aspects of dental disease. St. Louis, Mosby, 1936. $7.50.
Broderick, R. A.	Dental bacteriology. Outlines of dental science. Vol. 2. Edinburgh, Livingstone, 1926. $2.50.
Brothers, E. D.	Dental jurisprudence. St. Louis, Mosby, 1928. $2.25.
Brown, A. J.	Dental metallurgy. Outlines of dental science. Vol. 11. New York, Wood, 1928. $2.50.
Brown, W. L.	Endocrines in general medicine. New York, Hoeber, 1927. $3.00.
Buckley, J. P.	Modern dental materia medica, pharmacology and therapeutics. Philadelphia, Blakiston, 1926. $6.00.
Bulleid, Arthur	Textbook of bacteriology for dental students. St. Louis, Mosby, 1927. $4.50.
Bunce, E. W.	Bunce-Kanouse full denture technic. Chicago, Coe Laboratories, Inc., 1929. $1.25.
Bunting, R. W.	A textbook of oral pathology for students and practitioners of dentistry. Philadelphia, Lea & Febiger, 1929. $7.00.
Burchard, H. H., & Inglis, O. E.	Textbook of dental pathology and therapeutics for students and practitioners. Philadelphia, Lea & Febiger, 1926. $7.50.
Burkhart, H. J.	Care of the mouth and teeth. (National Health Series.) New York, Funk & Wagnalls, 1928. $0.30.
Buxton, J. L. D.	Dental pathology. Outlines of dental science. Vol. 7. New York, Wood, 1927. $2.50.
Buxton, J. L. D.	Dental surgery. Outlines of dental science. Vol. 8. New York, Wood, 1927. $2.50.
Cahn, L. R.	Basic principles of general and oral pathology. Brooklyn, N. Y., Dental Items of Interest, 1929. $4.50.
Campbell, Menzies	Those teeth of yours. London, Heinemann, 1931. $1.50.
Casto, T. D.	Questions and answers on pedodontology, with glossary. Philadelphia, Author, 1932. $2.50.
Cattell, Psyche	Dentition as a measure of maturity. Cambridge, Harvard University Press, 1928. $1.00.
Childs, Leslie	Law for the dentist. Philadelphia, S. S. White, 1934. (Subscription premium)
Churchill, H. R.	Human odontography and histology. Philadelphia, Lea & Febiger, 1932. $4.50.
Churchill, H. R.	Meyer's normal histology and histogenesis of the human teeth and associated parts. Philadelphia, Lippincott, 1935. $4.50.
Clark, C. A.	Dental radiography. Outlines of dental science. Vol. 5. New York, Wood, 1926. $2.50.
Cogswell, W. W.	Dental oral surgery. Pittsburgh, Pa., Dental Digest, Inc., 1932. $10.00.
Colyer, J. F., & Sprawson, Evelyn	Dental surgery and pathology. New York, Longmans, 1931. $12.50.
Colyer, Stanley	Chronic infection of the jaws: a short radiological and clinical study. New York, Macmillan, 1926. $3.50.
Committee on Costs of Medical Care	Medical care for the American people. Chicago, Univ. of Chicago Press, 1932. $1.50.
Dall, William	Ground porcelain inlays. London, Henry Kimpton, 1933. $5.25.

Daukes, S. H. — Medical museum: Modern developments, organization and technical methods based on a new system of visual teaching. London, Wellcome Foundation, Ltd, n.d. (No purchase orders accepted.)

Davis, Adelle — Optimum health. Los Angeles, California Graphic Press, 1935. $2.50.

Davis, M. M. — Paying your sickness bills. Chicago, University of Chicago Press, 1931. $2.50.

Dental Board of the United Kingdom — Four lectures on "general anaesthesia." London, Dental Board of the United Kingdom, 1926. $2.00.

Dental Board of the United Kingdom — Three lectures on "dental alloys." Delivered under the auspices of the Dental Board of the United Kingdom. London, Dental Board of the United Kingdom, 1927. $2.00.

Dewey, Martin, & Anderson, G. M. — Practical orthodontia. St. Louis, Mosby, 1935. $8.50.

Diamond, M. — Dental anatomy: a graphic presentation of tooth forms, etc. New York, Macmillan, 1935. $4.00.

Dilling, W. J., & Hallam, Samuel — Dental materia medica, pharmacology and therapeutics. London, Cassell & Co., 1935. $3.25.

Disraeli, I. — Vincent's disease, pyorrhea and allied subjects. Los Angeles, Calif., Dental Research Pub. Co., 1935. $6.00.

Dorrance, G. M. — Operative story of cleft palate. Philadelphia, Saunders, 1933. $6.50.

Doxtater, L. W. — Procedures in modern crown and bridge-work. Brooklyn, N. Y., Dental Items of Interest, 1931. $8.00.

Dutton, W. F., & Lake, G. B. — Parenteral therapy. Springfield, Ill., Thomas, 1936. $7.50.

Endleman, Julio — Special dental pathology; a treatise for students and practitioners. St. Louis, Mosby, 1927. $7.00.

Ennis, L. M. — Dental roentgenology. Philadelphia, Lea & Febiger, 1936. $6.50.

Farkasch, O. — Dilemmas of dentistry. New York, Dodd Bros., 1931. $3.50.

Federspiel, M. N. — Harelip and cleft palate. St. Louis, Mosby, 1927. $5.00.

Felcher, F. R. — Art of porcelain in dentistry. St. Louis, Mosby, 1932. $9.00.

Feldman, M. H. — Manual of exodontia. Philadelphia, Lea & Febiger, 1930. $3.50.

Ferguson, H. W. — Child's book of the teeth. Yonkers-on-Hudson, World Book Co., 1932. $0.68.

Fine, Samuel — Principles and practice of dental assistant. Worcester, Mass., Hamilton Pub. Co., 1931. $2.50.

Fischer, Guido — Local anesthesia in dentistry. Philadelphia, Lea & Febiger, 1933. $4.00.

Fish, E. W. — Experimental investigation of enamel, dentine and the dental pulp. London, John Bale, Sons & Danielsson, Ltd., 1933.

Fish, E. W. — Principles of full denture prosthesis. London, John Bale, 1933. $4.00.

Fones, A. C. — Mouth hygiene; a textbook for dental hygienists. Philadelphia, Lea & Febiger, 1934. $5.00.

Fones, A. C. — Preventive dentistry. Philadelphia, Lea & Febiger, 1925. $2.75.

Foote, J. S. — Bone as a measure of development: When and how we acquired our teeth. Chicago, American Dental Association, 1928. $2.00.

Frahm, F. W. — Principles and technics of full denture construction. Brooklyn, N. Y., Dental Items of Interest, 1934. $7.00.

Franzen, Raymond — Public health aspects of dental decay in children. New York, American Child Health Assn., 1930. $1.25.

Gies, W. J. — Dental education in the United States and Canada. New York, Carnegie Foundation, 1926. (Free.)

Gillett, H. W., & Irving, A. J. — Gold inlays by the indirect system. Brooklyn, N. Y., Dental Items of Interest, 1932. $8.00.

Goepp, R. M. — Dental state board questions and answers. Philadelphia, Saunders, 1928. $4.50.

Goslee, H. J. — Principles and practice of crown and bridge-work. Brooklyn, N. Y., Dental Items of Interest, 1926. $7.50.

Gottlieb, B., & Orban, B. — Die veränderungen der gewebe bei übermässiger beanspruchung der zähne. Leipzig, Georg Thieme, 1931. Unbound, $6.50. Bound, $7.00.

Graves, Lulu G.	Foods in health and disease. New York, Macmillan, 1932. $3.50.
Greenfield, A. L.	Interpretation of dental radiograms. Rochester, N. Y., Ritter Dental Mfg. Co., 1926. $2.50.
Gregory, W. K.	Our face from fish to man. New York, Putnam, 1929. $4.50.
Gwathmey, J. T.	Textbook of anesthesia. New York, Macmillan, 1929. $7.50.
Gwinn, C. D.	Textbook of exodontia. Philadelphia, Lea & Febiger, 1927. $2.75.
Gysi, Alfred	Special teeth for cross-bite cases. New York, Dentists' Supply Co., 1928. (Pamphlet.) (No purchase orders accepted.)
Hackh, I. W. D.	Chemical reactions and their equations. Philadelphia, Blakiston, 1928. $2.00.
Haden, R. L.	Dental infection and systemic disease. Philadelphia, Lea & Febiger, 1936. $2.50.
Hall, E. M.	Pulpless tooth problems. Detroit, Mich., Detroit Dental Manufacturing Co., 1930.
Hanau, R. I.	Dental engineering. Buffalo, N. Y., Author, 1926. (No purchase orders accepted.)
Hanau, R. I.	Hanau intraoral method vs. Gysi extraoral method. Buffalo, N. Y., Author, 1927. (No purchase orders accepted.)
Hanke, M. T.	Diet and dental health. Chicago, Univ. of Chicago Press, 1933. $4.00.
Harder, O. E.	Modern dental metallography. Minneapolis, Minn., Burgess-Roseberry Co., 1930. $3.75.
Harris, L. J.	Vitamins in theory and practice. New York, Macmillan, 1935. $3.00.
Harrow, Benjamin, & Sherwin, C. P.	Textbook of biochemistry. Philadelphia, Saunders, 1935. $6.00.
Hartman, L. L.	Teeth and the mouth. New York, Appleton, 1927. $1.50.
Hayes, L. V.	Clinical diagnosis of mouth diseases. Brooklyn, N. Y., Dental Items of Interest, 1935. $7.50.
Head, Joseph	Everyday mouth hygiene. Philadelphia, Saunders, 1925. $1.00.
Hedstrom, Gustav	Gangrene of dental pulp and its treatment. Stockholm, Sweden, Isaac Marcus, 1927. (No purchase orders accepted.)
Headridge, Davis, & Gibson, S. K.	Dental anatomy, human and comparative. Outlines of dental science. Vol. 6. New York, Wood, 1928. $2.50.
Herbst, Emil, & Apffelsteadt, Max	Atlas and grundriss der missbildungen der kiefer and zähne. München, J. F. Lehmanns, 1928. (No purchase orders accepted.)
Hertzler, E.	Technic of local anesthesia. St. Louis, Mosby, 1925. $5.50.
Hess, A. F.	Collected writings. 2 vols. Springfield, Ill., Thomas, 1936. $15.00.
Hess, Walter, & Zurcher, Ernst	Anatomy of the root-canals of the teeth. New York, Wood, 1925. $5.50.
Hewer, C. L.	Recent advances in anaesthesia and analgesia. Philadelphia, Blakiston, 1932. $3.50.
Hildebrand, G. Y.	Studies in masticatory movements of human lower jaw. Berlin, Gruyter, 1931. (No purchase orders accepted.)
Hodgen, J. D.	Practical dental metallurgy. St. Louis, Mosby, 1932. $3.75.
Hogeboom, F. E.	Practical pedodontia or juvenile operative dentistry and public health dentistry. St. Louis, Mosby, 1933. $6.50.
Hoke, C. M.	Testing precious metals: gold, silver, palladium, platinum; identifying, buying, selling. New York, Jewelers Technical Advice Co., 1935. $1.00.
Holliday, Houghton	Dental radiology handbook. New York, Macmillan, 1935. $2.00.
Hyatt, T. P.	Hygiene of mouth and teeth. Brooklyn, N. Y., Brooklyn Dental Pub. Co., 1929. $1.00.
Hyatt, T. P.	Prophylactic odontotomy: A practical and simple procedure for the prevention of caries in pit and fissure cavities. New York, Macmillan, 1933. $1.50.
Ivy, R. H., & Curtis, Lawrence	Fractures of the jaws. Philadelphia, Lea & Febiger, 1931. $4.50.
Jamieson, J. D. H.	Operative dentistry. Outlines of dental science. Vol. 9. New York, Wood, 1927. $2.50.

Jerman, E. C.	Modern x-ray technic. St. Paul, Bruce Pub. Co., 1928. $5.50.
Jordan, E. O.	Textbook of general bacteriology. Philadelphia, Saunders, 1935. $6.00.
Jordon, M. Evangeline	Operative dentistry for children. Brooklyn, N. Y., Dental Items of Interest, 1927. $5.00.
Kanner, Leo	Folklore of the teeth. New York, Macmillan, 1928. $4.00.
Kells, C. E.	Dentists' own book, including a complete bookkeeping and recording system. St. Louis, Mosby, 1925. $7.50.
Kells, C. E.	Three score years and nine. Brooklyn, N. Y., Dental Items of Interest, 1926. $5.00.
Kennedy, Edward	Partial denture construction. Brooklyn, N. Y., Dental Items of Interest, 1928. $7.50.
Kent, E. N.	Business side of dentistry. St. Louis, Mosby, 1929. $5.00.
Knapp, K. W.	Manual of fixed bridgework. New York, New York Univ. Press, 1935. $3.00.
Korkhaus, Gustav	Moderne orthodontische therapie. Berlin, Meusser, 1932.
Kraetzer, A. F.	Your long-suffering stomach. New York, McBride, 1933. $1.50.
Kronfeld, Rudolf	Histopathology of the teeth and their surrounding structures. Philadelphia, Lea & Febiger, 1933. $7.00.
Kuttler, Yury	Mis investigaciones sobre la denticion en 15,240 ninos y 782 adultos habiendo hecho 28,557 examenes. Mexico, D. F., Facultad Odontologica de la Universidad Nacional Autonoma de Mexico, 1933.
Lamb, Ruth de F.	American chamber of horrors. New York, Farrar & Rinehart, 1935. $2.50.
Lee, R. I., & Jones, L. W.	Fundamentals of good medical care. Chicago, Univ. of Chicago Press, 1933. $2.50.
LeGro, A. L.	Ceramics in dentistry. Brooklyn, N. Y., Dental Items of Interest, 1926. $7.50.
Leriche, R., & Policard, A.	Normal and pathological physiology of bone. St. Louis, Mosby, 1928. $5.00.
Leuck, Miriam S.	Study of dental clinics in the United States: 1930. Chicago, University of Chicago Press, 1932. $1.00.
Leuck, Miriam S.	Further study of dental clinics in the United States. Chicago, University of Chicago Press, 1932. $1.50.
Leven, Maurice, & Beck, Dorothy F.	Practice of dentistry and incomes of dentists in twenty states: 1929. Chicago, University of Chicago Press, 1932. $2.00.
Lindsay, Lilian	Short history of dentistry. London, John Bale, 1933. $1.50.
Livingston, Alexander	Dental histology. Outlines of dental science. Vol. 10. New York, Wood, 1928. $2.50.
Lloyd-Williams, E.	Dental mechanics: a manual for students and junior practitioners. London, Bale, 1931. $2.00.
Logan, J. D.	Dental prosthetics. Outline of dental science. Vol. 4. Edinburgh, Livingstone, 1926. $2.50.
Lucas, H. A.	Medicine for dental students. Baltimore, Wm. Wood & Co., 1933. $2.75.
MacNevin, M. G., & Vaughan, H. S.	Mouth infections and their relation to systemic diseases. New York, Joseph Purcell Memorial, 1933. $4.00.
Macphie, G. G.	Studies in aetiology of dental caries. London, John Bale, 1935. $2.50.
Maliniak, J. W.	Sculpture in the living: rebuilding face and form by plastic surgery. New York, Lancet Press, 1934. $3.00.
Margolis, H. M.	Conquering arthritis. New York, Macmillan, 1932. $2.00.
Marriott, W. M.	Infant nutrition; a textbook of infant feeding for students and practitioners of medicine. St. Louis, Mosby, 1935. $4.50.
Marsden, P. H.	Dental materia medica. Outlines of dental science. Vol. 3. Edinburgh, Livingstone, 1926. $2.50.
Marshall, J. A.	Diseases of the teeth; their diagnosis and treatment. Philadelphia, Lea & Febiger, 1926. $4.50.
Maximow, A. A., & Bloom, Wm.	Textbook of histology. Philadelphia, Saunders, 1934. $7.00.

McBride, W. C.	Juvenile dentistry. Philadelphia, Lea & Febiger, 1932. $2.75.
McCaw, Emma J.	Dental assistant. St. Louis, Mosby, 1926. $1.50.
McCollum, E. V., & Becker, Ernestine	Food, nutrition and health. Baltimore, Authors, 1933. $1.50.
McCollum, E. V., & Simmonds, Nina	Newer knowledge of nutrition. New York, Macmillan, 1929. $4.00.
McCoy, J. D.	Applied orthodontics. Philadelphia, Lea & Febiger, 1935. $4.50.
McGehee, W. H. O.	Textbook of operative dentistry. Philadelphia, Blakiston, 1930. $10.
Mead, S. V.	Anesthesia in dental surgery. St. Louis, Mosby, 1935. $6.50.
Mead, S. V.	Diseases of the mouth. St. Louis, Mosby, 1932. $10.00.
Mead, S. V.	Oral surgery. St. Louis, Mosby, 1933. $12.50.
Mellanby, May	Diet and the teeth: an experimental study. Part I. Dental structure in dogs. London, His Majesty's Stationery Office, 1929. $7.00.
Mellanby, May	Diet and the teeth: an experimental study. Part II. A. Diet and dental disease. B. Diet and dental structure in mammals other than the dog. London, His Majesty's Stationery Office, 1930. $1.00.
Merritt, A. H.	Periodontal diseases: diagnosis and treatment. New York, Macmillan, 1930. $4.00.
Mills, C. P., & Humphreys, Humphrey	Text-book of surgery for dental students. London, Arnold, 1935. $5.00.
Moorehead, F. B., & Dewey, Kaethe W.	Pathology of the mouth. Philadelphia, Saunders, 1925. $7.00.
Morgan, W. D., & Lester, H. M.	Leica manual. New York, Morgan & Lester, 1935. $4.00.
Neil, Ewell	Full denture practice. Nashville, Tenn., Marshall and Bruce Co., 1932. $3.50.
Nevin, Mendel, & Puterbaugh, P. G.	Conduction, infiltration and general anesthesia in dentistry. Brooklyn, N. Y., Dental Items of Interest, 1927. $6.00.
Nichols, I. G.	Prosthetic dentistry: an encyclopedia of full and partial denture prosthesis. St. Louis, Mosby, 1930. $12.50.
Nodine, A. M.	Minor oral surgery. London, Cottrell, 1935.
Ochsner, E. H.	Social insurance and economic security. Boston, Bruce Humphries, 1934. $2.50. (Also 25c edition.)
Okumura, Tsurukichi	Present status of dentistry in Japan. Tokyo, Japan, Japan Dental Assn., 1931. (Pamphlet.) (No purchase orders accepted.)
Orban, Balint	Dental histology and embryology. Philadelphia, Blakiston, 1929. $5.00.
Osgood, H. A.	Teeth and jaws roentgenologically considered. Annals of roentgenology, volume 5. New York, Hoeber, 1929. $10.00.
Ottolengui, Rodrigues	Table talks on dentistry. Brooklyn, N. Y., Dental Items of Interest, 1935. $7.00.
Palmer, Bissell	Paying through the teeth. New York, Vanguard Press, 1935. $2.00.
Palmer, G. T., Derryberry, Mahew & Van Ingen, Philip	Health protection for preschool child: national survey of use of preventive medical and dental service for children under six. New York, Century, 1931. $2.50.
Perry, Maude A.	Dietetics and nutrition. St. Louis, Mosby, 1930. $2.50.
Phelps, Edith M.	Socialization of medicine. New York, Wilson, 1930. $0.90.
Philadelphia County D.S.	Human face. Philadelphia, S. S. White, 1935. $2.00.
Pollia, J. A.	Fundamental principles of alveolo-dental radiology. Brooklyn, N. Y., Dental Items of Interest, 1930. $8.00.
Posner, J. J.	Minor oral surgery simplified. Philadelphia, Patterson & White, 1928. $2.00.
Prinz, Herman	Dental formulary. Philadelphia, Lea & Febiger, 1936. $3.50.
Prinz, Herman	Dental materia medica and therapeutics. St. Louis, Mosby, 1926. $7.50.
Prinz, Herman, & Greenbaum, S. S.	Diseases of the mouth and their treatment. Philadelphia, Lea & Febiger, 1935. $9.00.
Prinz, Herman	Diseases of soft structures of teeth. Philadelphia, Lea & Febiger, 1928. $6.50.

Prothero, J. H.	Prosthetic dentistry. Chicago, Medico-Dental Pub. Co., 1928. $10.00.
Pusey, W. A.	Doctor of the 1870's and 1880's. Baltimore, C. C. Thomas, 1932. $3.00.
Quigley, D. T.	Notes on vitamins and diets. Chicago, Consolidated Book Publishers, Inc., 1933. $1.00.
Raper, H. R.	Clinical preventive dentistry. Rochester, N. Y., Ritter Dental Mfg. Co., 1926. $3.50.
Rapp, F. W.	Elements of anatomical articulation or the mathematics of dental prosthetics. London, Bale, 1930. $2.00.
Ray, K. W.	Metallurgy for dental students. Philadelphia, Blakiston, 1931. $3.00.
Report of Committee on Growth and Development	Growth and development of the child. Part III. Nutrition. (A publication of White House Conference on Child Health and Protection.) New York, Century, 1932. $4.00.
Report of Committee on Public Health Organization.	Public health organization. (A publication of White House Conference on Child Health and Protection.) New York, Century, 1932. $3.00.
Reports of Subcommittees on Nutrition and Health Centers	Nutrition service in the field. Child health centers: a survey. (A publication of White House Conference on Child Health and Protection.) New York, Century, 1932. $2.00.
Rhinehart, D. A.	Roentgenographic technique. Philadelphia, Lea & Febiger, 1936. $6.50.
Roberts, Lydia J.	Nutrition work with children. Chicago, University of Chicago Press, 1927. $3.50.
Rogers, Gladys G., & Thomas, Leah C.	New pathways for children with cerebral palsy. New York, Macmillan, 1935. $2.50.
Rose, Mary S.	Foundations of nutrition. New York, Macmillan, 1927. $2.75.
Rubinow, I. M.	Quest for security. New York, Holt, 1934. $3.50.
Rukeyser, M. S.	Doctor and his investments. Philadelphia, Blakiston, 1931. $2.50.
Sampson, Edward	Common sense dentistry. London, Cottrell & Co., 1935. $2.25.
Sampson, Edward	Black ivory. London, Henry Kimpton, 1936. $1.75.
Schroff, Joseph	Fundamentals of pathology. New York, W. A. Broder, 1929. $2.50.
Schutzman, A. M.	Irregular teeth: causes, effects. Baton Rouge, La., Franklin Press, 1934. $2.00.
Schwartz, J. R.	Cavity preparation and abutment construction. Brooklyn, N. Y., Dental Items of Interest, 1936. $6.50.
Schwartz, J. R.	Practical dental anatomy and tooth carving. Brooklyn, N. Y., Dental Items of Interest, 1935. $3.50.
Scruggs, A. M.	Glory on earth. (A book of poems by a dentist.) Oglethorpe Univ. Press, 1933. $2.00.
Sears, V. H.	Full denture procedure. New York, Macmillan, 1929. $2.00.
Seldin, H. M.	Practical anesthesia for dental and oral surgery. Philadelphia, Lea & Febiger, 1934. $7.00.
Shaw, D. M.	Dental prosthetic mechanics. London, Arnold, 1927. $7.50.
Shelling, D. H.	Parathyroids in health and in disease. St. Louis, Mosby, 1936. $5.00.
Sherman, H. C.	Food and health. New York, Macmillan, 1934. $2.50.
Sherman, H. C.	Vitamins. New York, Chemical Catalogue Co., Inc., 1931. $6.00.
Sherwood, N. P.	Immunology. St. Louis, Mosby, 1935. $6.00.
Sicher, Harry & Tandler, Julius	Anatomie für Zahnärzte. Vienna, Julius Springer, 1928. (No purchase orders accepted.)
Silverman, S. L.	Principles and practice of oral surgery. Philadelphia, Blakiston, 1926. $6.00.
Simmons, J. S., & Gentzkow, C. J.	Laboratory methods of the United States army. Philadelphia, Lea & Febiger, 1935. $6.50.
Simon, P. W.	Fundamental principles of systematic diagnosis of dental anomalies. Boston, Stratford, 1926. $5.00.
Simon, W., & Base, Daniel	Manual of chemistry. Philadelphia, Lea & Febiger, 1927. $5.00
Simons, A. M., & Sinai, Nathan	Way of health insurance. Chicago, University of Chicago Press, 1932. $2.00.

Simpson, C. O.	Advanced radiodontic interpretation. St. Louis, University Press, 1931. $25.00. (Because of the unusual price and its lack of durability a rental fee of $1.00 will be charged for this book for each two weeks it is in circulation.)
Simpson, C. O.	Technic of oral radiography. St. Louis, Mosby, 1928. $5.00.
Simpson, C. O.	Toothsome topics. St. Louis, University Press, 1931. $2.50.
Skinner, E. W.	Dental materials and technology. Cleveland, Ohio, Author, 1933.
Smith, D. T.	Oral spirochetes and related organisms in fusospirochetal disease. Baltimore, Williams & Wilkins, 1932. $4.50.
Smith, G. F. R.	Dental anaesthesia. Outlines of dental science. Vol. 1. Edinburgh, Livingstone, 1926. $2.50.
Smyth, Corisande, & Young, Matthew	Facial growth in children. London, His Majesty's Stationery Office, 1932. $0.75.
Sorrin, Sidney, & Miller, S. C.	Practice of periodontia. New York, Macmillan, 1928. $3.50.
Southwell, Charles	Your dentist: that which you have a right to expect of him, etc. Milwaukee, Wis., Gilbert Lee Company, 1934. $1.30.
Steadman, F. St. J.	Pyorrhea alveolaris. St. Louis, Mosby, 1927. $9.25.
Stibbe, E. P.	Anatomy for dental students. Baltimore, Wm. Wood & Co., 1934. $6.00.
Stieglitz, Julius	Chemistry in medicine. New York, Chemical Foundation, 1928. $2.00.
Stillman, P. R., & McCall, J. O.	Textbook of clinical periodontia. New York, Macmillan, 1927. $4.50.
Stillson, W. C.	Dental anatomy: classroom and laboratory quiz compend with supplementary notes. Philadelphia, Saunders, 1929. $2.25.
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Zoethout, W. D.	Textbook of physiology. St. Louis, Mosby, 1935. $4.00.

Written Instructions for Your Denture Patients

A fourth printing of "Your New Teeth," a booklet for denture patients, has just come off the press. This booklet is intended primarily for the patient who is wearing dentures for the first time. It enumerates some of the difficulties that may be encountered when one first wears dentures and offers suggestions as to how these difficulties may be overcome. There is also much of interest to the patient who has been wearing dentures, as information is given regarding the care, repair and rebasing of dentures. The information in this booklet was taken from the article entitled "Instructions for the Edentulous Patient," by B. L. Hooper, which was published in The Journal, February, 1932. The price of these booklets is: 25, $1.00; 50, $1.50; 100, $2.00. Kindly send remittances with order. A sample of booklet will be sent on request.

The Dental Creed

Copies of the creed are available in form suitable for framing from the Library Bureau of the American Dental Association, 212 E. Superior St., Chicago, at 50 cents. They are 10 by 15 inches and are printed on high grade paper in brown ink. The initial letter may be obtained in red or green, as preferred. Each copy is signed by the author. This creed appeared as an editorial in the August, 1934, issue of The Journal. Kindly send remittance with order.

Orthodontia Editorial

A few more copies of the tribute to orthodontia, which originally appeared as an editorial, may be obtained. This editorial is reprinted in form suitable for framing, on good quality paper, measuring 10 by 15 inches. This print is brown with the initial in green or red, as preferred. The editorial is signed in brown by the author. The cost per copy is 50 cents. Send your order and remittance to the Library Bureau.

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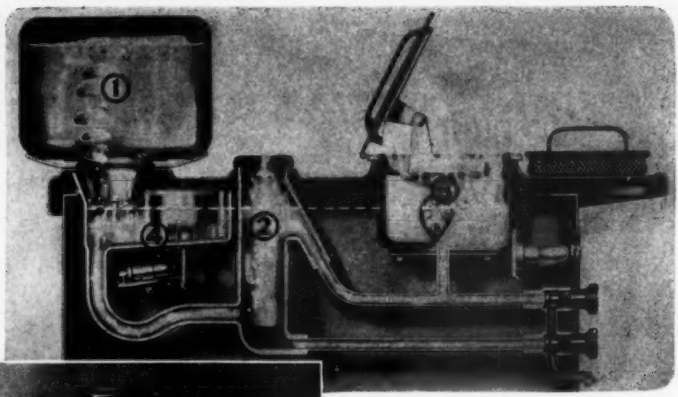

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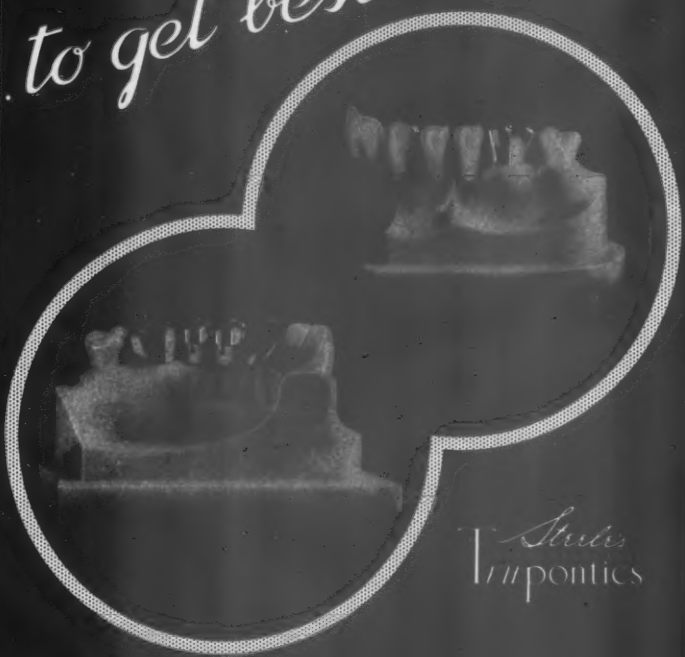

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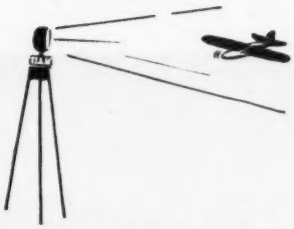

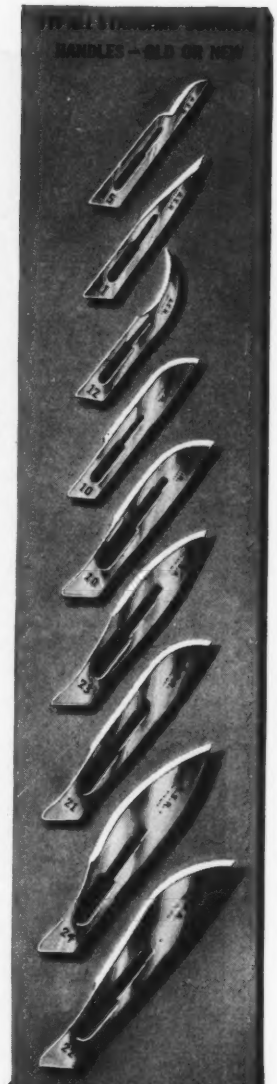

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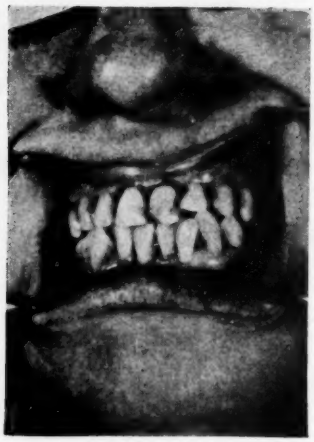

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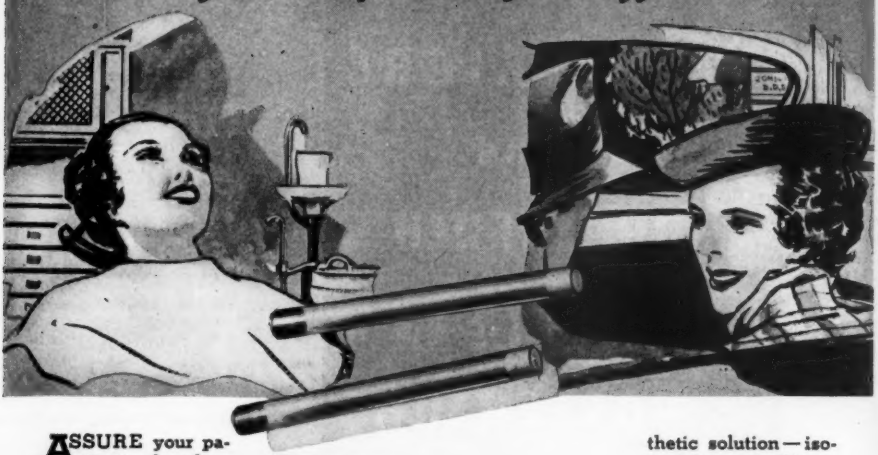

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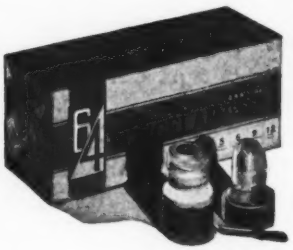

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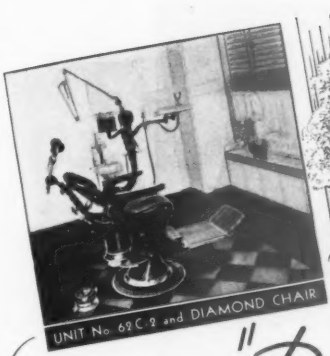

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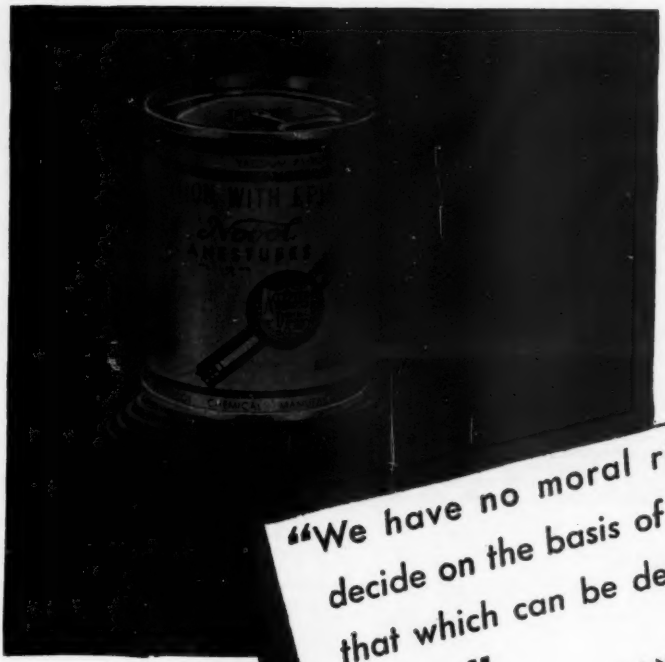

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You have a right to be *sure* that the local anesthetic solution you use is compatible with the delicate tissues into which it is injected. You have a right to be sure that the solution is as *fresh* and *potent* as though you prepared it at the chair.

Novol Metal Cap Anestubes provide that assurance. They contain buffered compatible anesthetic solution; they are packed in vacuum, impervious to oxidation.

Use Metal Cap Anestubes and Novampuls
Sleep well-o-nights

Metal Cap Anestubes and Novampuls are VACUUM PACKED

NOVOCOL CHEMICAL MANUFACTURING CO., Inc.
2921-23 ATLANTIC AVENUE, BROOKLYN, NEW YORK
San Francisco, Cal. Toronto, Canada London, England

but NO SEPARATION

FROM Detroit to the Pacific and back, the Detroit Testing Laboratory, specialists in testing products, shipped by freight two drums of Kerr Cristobalite Investment, bearing their own special seals.

Five thousand miles of jolts, jars, jounces and shakes! Three solid weeks of rolling, pitching and bumping, including changes of cars!

Seals unbroken, these drums returned eventually to the laboratory. Their chemists carefully tested contents of both drums, *top* and *bottom*. "Perfect condition" was the verdict. *"Absolutely no separation."*

We could have confidently foretold the result. So could almost *every* experienced Dentist. Kerr Cristobalite Investment never separated for you—nor for anyone else. It is the one Investment outstanding for that merit. Also, it dips easily from the container, needs no costly packing system, and produces, year after year, castings *that fit.*

This spectacular test merely confirms your faith in a preparation that will continue to serve you well.

DETROIT DENTAL MFG. CO.

KERR CRISTOBALITE INVESTMENT

REG. U.S. PAT. OFF.

JUNIOR MEMBERS ATTENTION

The Journal is mailed to you under second class rate and therefore will not be forwarded by the Post Office.

We must have your correct address to prevent delay.

Please advise us of any change of address—promptly—

Thank You

AMERICAN DENTAL ASSOCIATION
212 East Superior Street
Chicago, Ill.

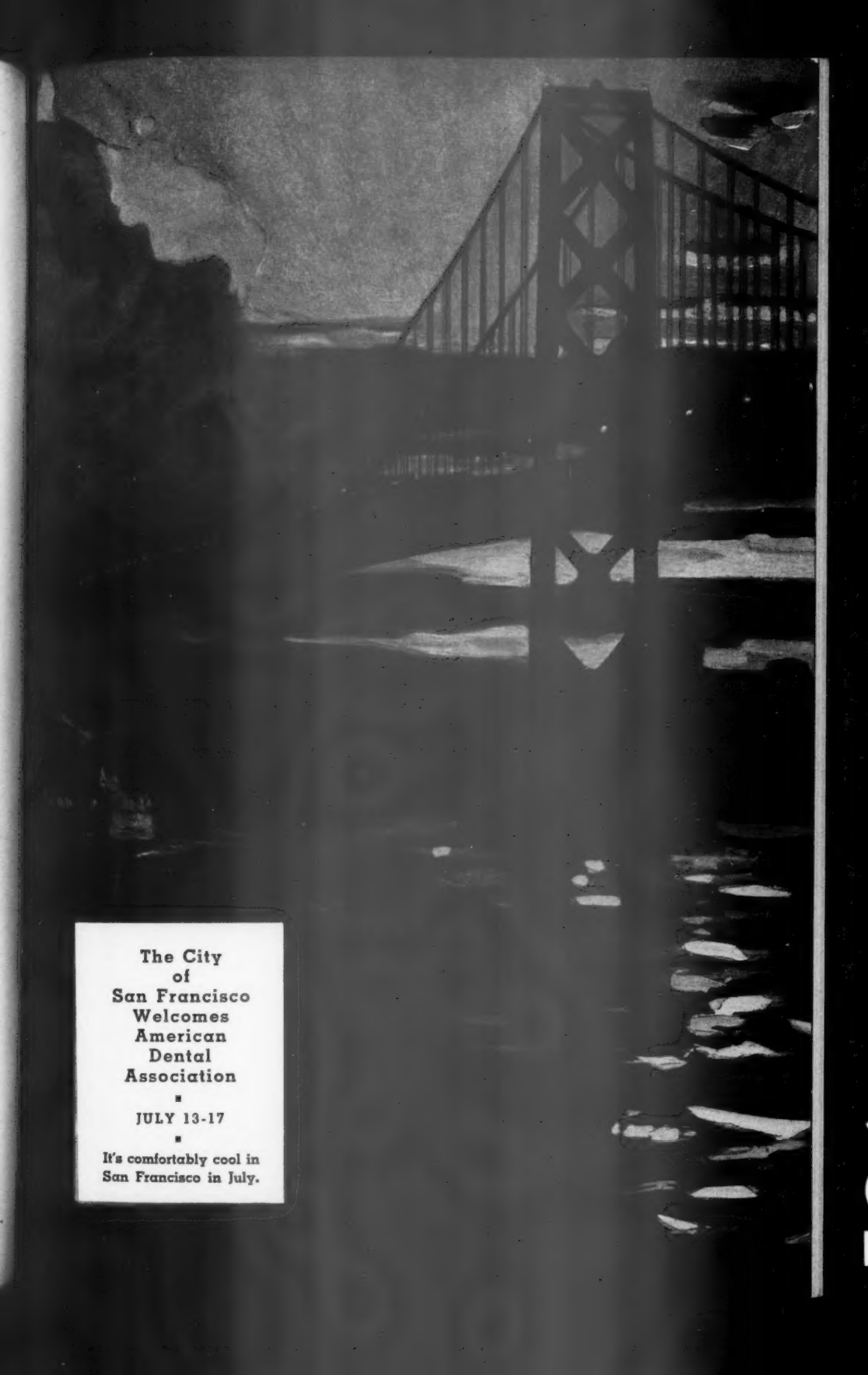
Please send the Journal to the following address beginning with the_____issue.

Name_____ Street_____

City_____ State_____

My old address given below is to be cancelled.

Street_____ City_____ State_____

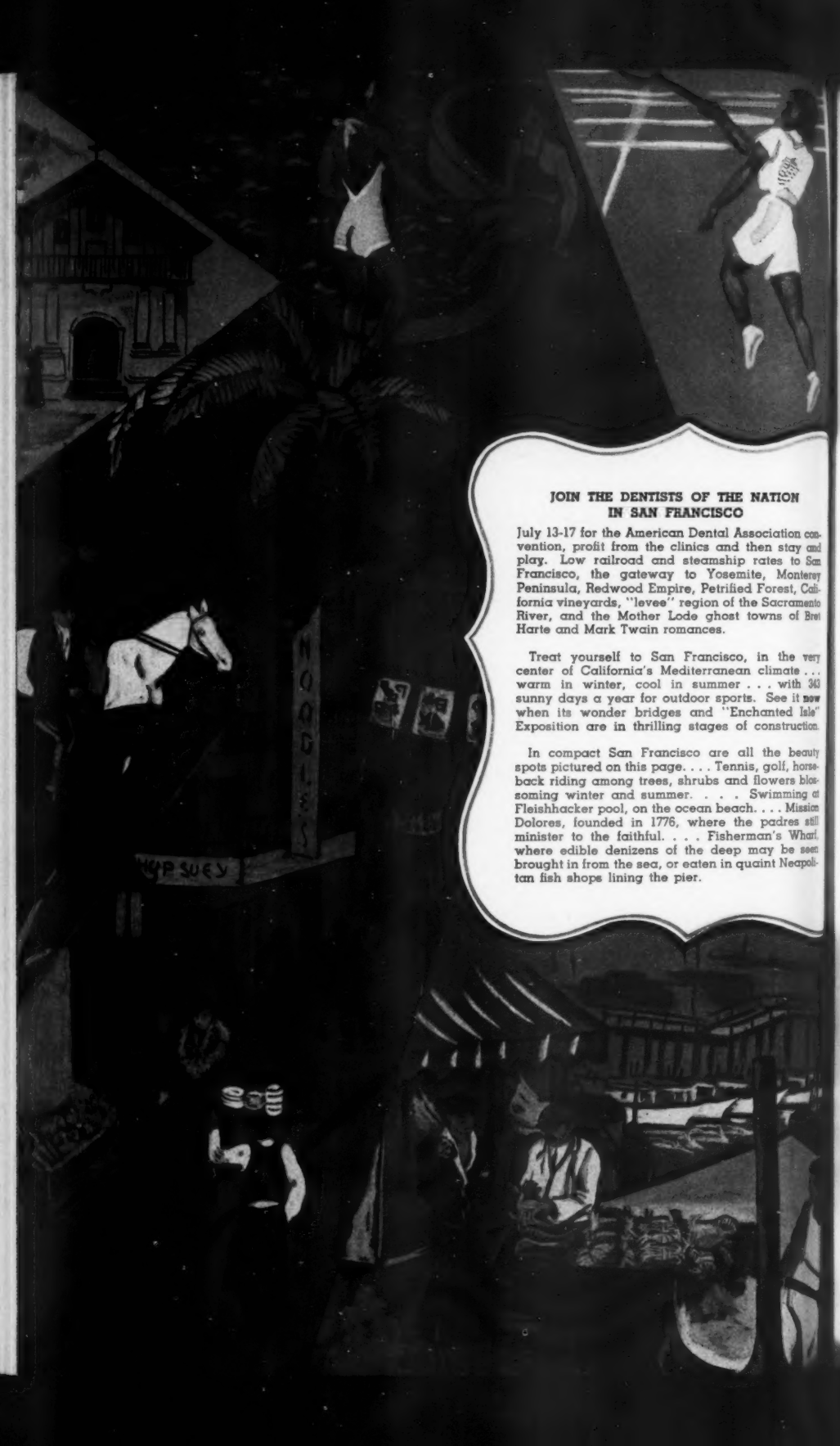

The City
of
San Francisco
Welcomes
American
Dental
Association
JULY 13-17
It's comfortably cool in
San Francisco in July.

SAN FRANCISCO ON "GLAMOUR BAY"

ABOVE is an artist's conception of the San Francisco Bay Exposition as it will appear when it opens in 1939. This year you can see it and the two world wonder bridges in construction. **BELOW** is one of San Francisco's public golf links overlooking the Golden Gate and its 4200-foot span—the most beautiful course in the world. Fairways here are always green, winter and summer. The FRONT COLOR PAGE is an oil painting of the San Francisco-Oakland Bay Bridge, deeper, longer, greater, and costlier than any bridge ever built by man.

ABOVE is an artist's conception of the San Francisco Bay Exposition as it will appear when it opens in 1939.

public golf links overlooking the Golden Gate and its 4200-foot span—the most beautiful course in the world. Fairways here are always green, winter and summer. The FRONT COLOR PAGE is an oil painting of the San Francisco-Oakland Bay Bridge, deeper, longer, greater, and costlier than any bridge ever built by man.



JOIN THE DENTISTS OF THE NATION IN SAN FRANCISCO

July 13-17 for the American Dental Association convention, profit from the clinics and then stay and play. Low railroad and steamship rates to San Francisco, the gateway to Yosemite, Monterey Peninsula, Redwood Empire, Petrified Forest, California vineyards, "levee" region of the Sacramento River, and the Mother Lode ghost towns of Bret Harte and Mark Twain romances.

Treat yourself to San Francisco, in the very center of California's Mediterranean climate . . . warm in winter, cool in summer . . . with 343 sunny days a year for outdoor sports. See it **now** when its wonder bridges and "Enchanted Isle" Exposition are in thrilling stages of construction.

In compact San Francisco are all the beauty spots pictured on this page. . . . Tennis, golf, horseback riding among trees, shrubs and flowers blossoming winter and summer. . . . Swimming at Fleishhacker pool, on the ocean beach. . . . Mission Dolores, founded in 1776, where the padres still minister to the faithful. . . . Fisherman's Wharf, where edible denizens of the deep may be seen brought in from the sea, or eaten in quaint Neapolitan fish shops lining the pier.

SEEPAGE

COULD UNDERMINE SKYSCRAPERS

!

FLECK'S CEMENT

• • COUNTERACTS DANGER OF SEEPAGE BECAUSE IT IS IMPERVIOUS TO THE FLUIDS OF THE MOUTH AND RESISTS THE INROADS OF THOSE DESTRUCTIVE ELEMENTS EVER PRESENT IN THE ORAL CAVITY!

Summary of Dental Requirements of A. D. A. Specifications No. 8 for Dental Cementing Medium.

CONSISTENCY OF MIX

Disk 30 ± 1 mm. in diameter.

Time of setting at 99° F.
Minimum 4 minutes, maximum 10 minutes.

Ultimate compressive strength.
Minimum in 1 hour, 5,000 lbs. per sq. in.
Minimum in 7 days, 12,000 lbs. per sq. in.

Film thickness microns.
Maximum 50 microns.

Disintegration.
Maximum per cent by weight 1.0.

How Fleck's Cement Proved on These Requirements (Taken from Journal of American Dental Assn., Nov., 1934, p. 1913).

CONSISTENCY OF MIX

Disk 34 ± 1 mm. in diameter.

Fleck's Cement set in 9 minutes (from time mix is started).

Fleck's Cement showed ultimate compressive strength of 7,538 lbs. per sq. in. in 1 hour; 13,512 lbs. per sq. in. in 7 days.

Fleck's Cement has film thickness of 17 microns.

Fleck's Cement showed disintegration by weight of 0.14 per cent.

Fleck's Cement conforms to the requirements prescribed by U. S. Pharmacopeia (current edition) regarding arsenic content.

"PROVED Best By Scientific TEST"

FLECK'S CEMENT

SOLD AT ALL DENTAL DEPOTS

Mfg. By—MIZZY, Inc., 105 East 16th Street New York

Widen The "Beneficial Circle"

ARM & HAMMER

BAKING SODA

Is Sodium Bicarbonate U.S.P.

USEFUL every day in the practice of dentistry, Sodium Bicarbonate is so often employed that its cost must be considered—used in the vulcanizer it prevents the black deposit on the inside; in the sterilizer it protects instruments from tarnish and rust; it is helpful in removing accumulations from artificial dentures.

Our baking soda is pure Sodium Bicarbonate of U.S.P. quality. Sold under two brand names, Arm & Hammer and Cow Brand which are identical, this dependable essential is a product of eighty-nine years' experience.

Modern scientific methods and frequent analyses assure the maintenance of our Sodium Bicarbonate at uniform standard quality. Use it with confidence for every purpose where Sodium Bicarbonate is required, it is acceptable to the Council on Dental Therapeutics of the American Dental Association, and is classified as an official U.S.P. remedy by the Council on Pharmacy and Chemistry of the American Medical Association.

This high-grade Bicarbonate of Soda is sold nation-wide in handy, sealed containers for just a few cents a package. Its use is both a convenience and an economy.

Business Established in 1846

CHURCH & DWIGHT CO., Inc.

10 Cedar Street New York, N.Y.

WAKE UP!

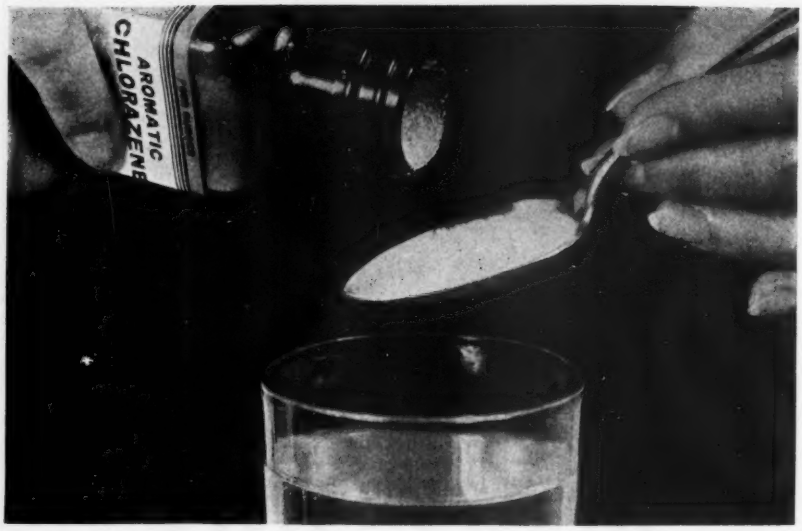
"Wakes up sleepy mouths" says a current Iodent advertisement in magazines and street cars. And millions upon millions of Iodent booklets and charts are also waking up the public—educating it to the value of oral hygiene and *ethical dentistry*.

But thousands of dentists have not fully awakened to the importance of educational work being carried on by Iodent. You directly benefit from this work—which is fostering public regard for the dental profession. It can be continued if you and other ethical dentists actively recommend Iodent Tooth Paste to your patients. And Iodent deserves your endorsement because it is the one dentifrice sold everywhere that bears the Seal of Acceptance of the A.D.A.

This subject is well worth discussion at local and state society meetings.

IODENT

TOOTH PASTE



The solution is useful for the irrigation of fistulas and in trench mouth, pyorrhea and similar conditions.

Aromatic Chlorazene Powder

FILLS THE DENTIST'S NEED FOR AN EFFICIENT, ECONOMICAL ANTISEPTIC AND DEODORANT

ABBOTT'S Aromatic Chlorazene provides Dakin's antiseptic in really pleasant form with salt. Its effective germicidal and deodorizing action plus its extreme low cost makes it ideal for routine use in the dentist's office.

One teaspoonful in a glass of water make a satisfactory solution for general use. It is non-toxic and non-irritating. It promptly overcomes breath odors, leaving the mouth with a fresh, toned-up feeling and sweet, clean taste.

Aromatic Chlorazene Powder contains 5% Chlorazene (Chloramine, U.S.P.), sodium chloride, sodium bicarbonate, saccharin and eucalyptol. Supplied in 2-oz., 4-oz., and 1-lb. bottles by your dealer or druggist. This product is distinctly different from and not to be confused with Chlorazene Tablets.

Abbott Laboratories

NORTH CHICAGO, ILLINOIS

78th Annual Session—San Francisco, Calif., July 13-17—1936

CANNED FOODS AND THE PUBLIC HEALTH

V. FOOD IN THE OPEN CAN

• In September 1935, the facts about food in the open can were presented on this page. It was stated that there was no reason, from the standpoint of food poisoning, why food must be removed immediately after the can is opened. This statement bore the Seal of Acceptance of The Committee on Foods of the American Medical Association.

However, since that time, two incidents have occurred which lead us to present again the facts concerning food in the open can.

First, late last fall, a national organization dedicated to the relief of human distress during war and disaster, issued a list of precautions designed to reduce accidents in the home, in which it was erroneously recommended that food be removed from the can immediately. The Department of Agriculture detected this error and called it to the attention of those responsible for issuance of the recommendations. A correction was made as soon as possible but the damage had already been done. The original safety recommendations had meanwhile been issued in schools and newspapers throughout the country, thus giving further support to this old, unbased prejudice against canned foods.

Second, in the early months of 1936, a release regarding food in the open can was made by a national press service to newspapers throughout the land. The strong inference was made in this press release that food left in the open can might become hazardous to consumer health.

This dissemination of misinformation, referred to in the two instances cited above, has caused an increase in the number of consumer inquiries concerning the safety of food in the open can. To reply to these requests for reliable information, we can well quote from a recent release made by the Department of Agriculture (1).

(1) U.S.D.A. Press Release, Feb. 23, 1936

"It is just as safe to keep canned food in the can it comes in—if the can is cool and covered—as it is to empty the food into another container. Thousands of housewives are firm in the faith that canned goods ought to be emptied as soon as the can is opened, or at least before the remainder of the food goes into the refrigerator—one of the persistent food fallacies. The question keeps coming to the Bureau of Home Economics in letters from home-makers.

"A few acid foods may dissolve a little iron from the can, but this is not harmful, not dangerous to health. Cans and foods are sterilized in the 'processing'. But the dish into which the food might be emptied is far from sterile. In other words, it is likely to have on it bacteria that cause food to spoil.

"Whether in the original can or in another container, the principal precautions for keeping food are—Keep it cool and keep it covered."

AMERICAN CAN COMPANY
230 Park Avenue, New York City

This is the thirteenth in a series of monthly articles, which will summarize, for your convenience, the conclusions about canned foods which authorities in nutritional research have reached. We want to make this series valuable to you, and so we ask your help. Will you tell us on a post card addressed to the American Can Company, New York, N. Y., what phases of canned foods knowledge are of greatest interest to you? Your suggestions will determine the subject matter of future articles.

Low Transportation Costs

BUSCH BURS

In the molded material packages that simulate genuine ivory

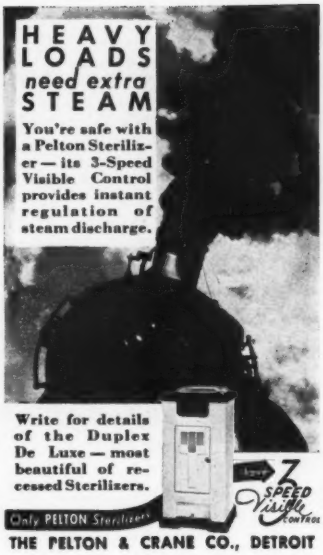
Beautiful—convenient—compact. Three words sum up the whole story of these new half-dozen packages of Busch Burs.

Made of Trolitul, one of today's richest-looking molded materials, this strong, light package gives the luxurious impression of genuine ivory. A window, also of Trolitul, allows you to see the burs at a glance. And the burs? They're the same good burs always associated with the name of Busch.

Your dealer would like to show you these new, modern packages of Busch Burs. Why not see him this week?

A. Pfingst, Bible House, New York.

Busch Burs
"Quality at Low Cost"


HEAVY LOADS need extra STEAM
You're safe with a Pelton Sterilizer — its 3-Speed Visible Control provides instant regulation of steam discharge.
Write for details of the Duplex De Luxe — most beautiful of recessed Sterilizers.
Only PELTON Sterilizers
3 SPEED Visible Control

THE PELTON & CRANE CO., DETROIT

NOTES AND QUOTES

Toss a typewriter into any group of three or more humans and you are sure to wing at least two who have written, are writing, or are contemplating some form of literary composition. It's a weird thing, that universal urge toward authorship. Actually, there is no profession more exhausting and uncertain, more dependent on genuine talent, skill, and—yes—luck. No other profession is so competitive, so congested, offers such small rewards to those who never reach beyond the ranks of mediocrity. —Ann Morse.

* * *

I teach my children that things found beneficial to man are generally good for them; but that there is nothing "sacred," in the sense that it should be excepted from critical scrutiny. I teach them that all real education is self-education, wherever it may be obtained. I teach them that there is no knowledge in the possession of anyone that they have no right to, or that they will be the better off for not knowing.—Harold McGuire.

Who *wouldn't* feel Happy!..

HE BEGAN wearing his new denture only yesterday, yet he's already on accustomed terms with his ever enjoyable cigar. That seems to him a veritable feat; his dentist, however, had merely prescribed DR. WERNET'S Powder.

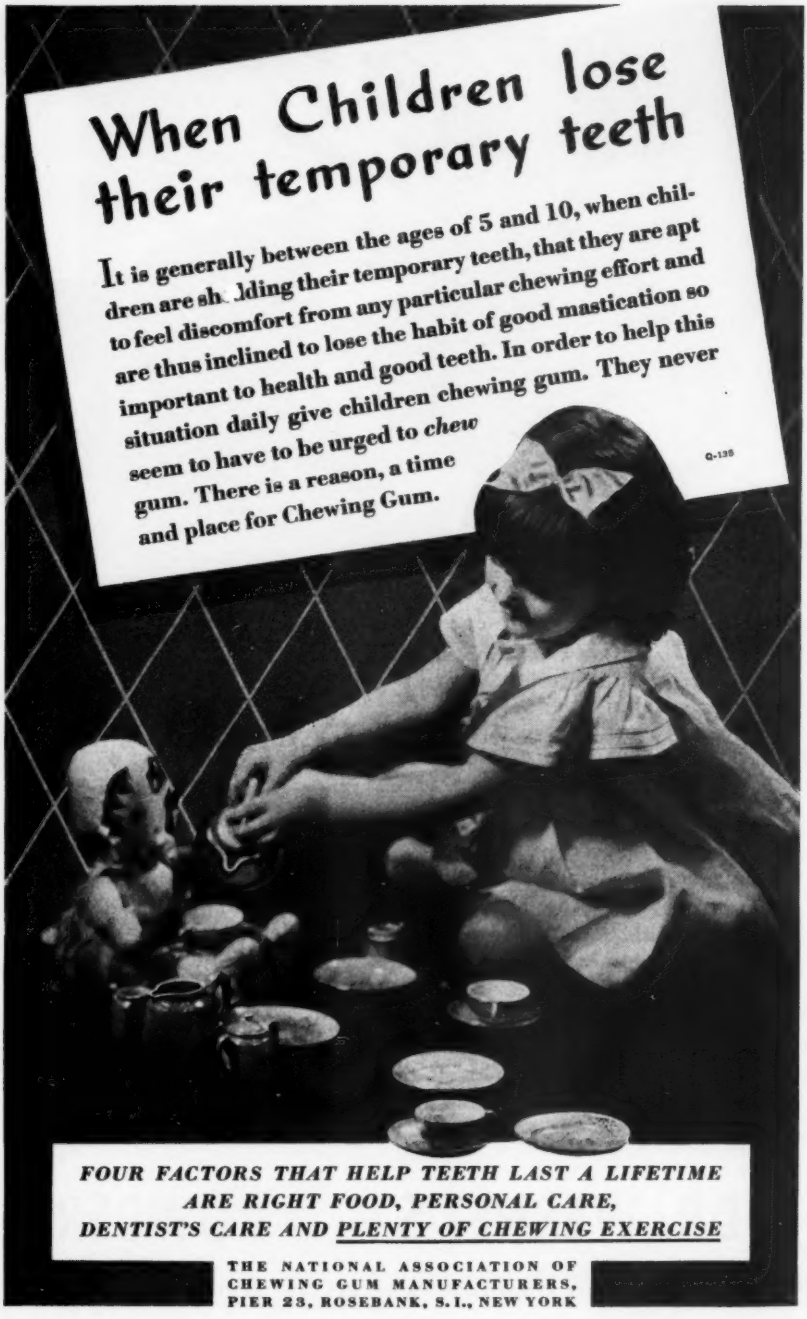
It forms an elastic, adhesive, and protective cushion between the denture and the tissues. It holds the denture, *mechanically,* more firmly in place, and soothes and protects tissues that are tender. By promoting comfort and greater assurance, it makes it possible for the denture to be worn more regularly, thus hastening its mastery by the patient.

Send for YOUR supply—FREE!

Simply mail the lower portion of this page with your card or letterhead to WERNET DENTAL MFG. CO., 882 Third Ave., Brooklyn, N.Y.

DR. WERNET'S POWDER

Speeds the Mastery of a New Denture!


When Children lose their temporary teeth
It is generally between the ages of 5 and 10, when children are sh_ lding their temporary teeth, that they are apt to feel discomfort from any particular chewing effort and are thus inclined to lose the habit of good mastication so important to health and good teeth. In order to help this situation daily give children chewing gum. They never seem to have to be urged to chew gum. There is a reason, a time and place for Chewing Gum.
Q-135
FOUR FACTORS THAT HELP TEETH LAST A LIFETIME
ARE RIGHT FOOD, PERSONAL CARE,
DENTIST'S CARE AND PLENTY OF CHEWING EXERCISE
THE NATIONAL ASSOCIATION OF CHEWING GUM MANUFACTURERS, PIER 23, ROSEBANK, S. I., NEW YORK

78th Annual Session—San Francisco, Calif., July 13-17—1936

FOR THE MANAGEMENT OF PYORRHEA BY ELECTROCOAGULATION

General Electric announces a fine, new instrument, clinically checked and approved, and primarily designed for utilization of the Webb technique

G-E MICRO-SURGICAL UNIT—Model "B"

● Delivers high frequency current of the proper characteristics for this delicate and localized coagulation.

Has spark-gap with "micrometer" control. Adjustments as fine as 1/2000 of an inch are possible to give accurate control and exact duplication of technique.

Design is predominantly "dental" to harmonize with other equipment in the office.

THE WEBB TECHNIQUE★

★ Unusually favorable prognosis in all cases where 30% or more attachment remains.
★ Preliminary instrumentation, scaling and polishing not necessary.
★ No anesthesia required.
★ Little after-pain or discomfort.
★ Conspicuous absence of post-operative shock and hemorrhage.
★ (Preliminary report in Dental Survey, August, 1935. Reprint on request.)

G-E MODEL "B" MICRO-SURGICAL UNIT. Complete with Webb electrode, foot switch, attachment cord and plug for operation on 115 volt, 50-60 cycle alternating current . . . $155.00 f. o. b. Chicago. (Also arranged for other voltages and frequencies and for direct current operation.)

FOR FURTHER FACTS, FIGURES AND FOLDER, WRITE DEPT. H116

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2012 JACKSON BOULEVARD CHICAGO, ILLINOIS

You wouldn't wear "tails" on a cross-country jaunt

Of course not . . . We've all a yen for appropriateness, whether it has to do with our favorite sport or profession. The professional dignity of the dentist demands that he wear a correct and comfortable smock — *one designed with his needs in mind.*

ANGELICA'S 323

Angelica's Smock, 323, pictured at left, resumes its rightful place in the dentist's office. It has a reversible front that can be quickly turned when soiled. This smock wears easily — it is made of Angelica's specially constructed White Twill, and it is built for comfort. Ties in back — no buttons to come off in laundering. Side-slit openings permit access to inner pockets. Sizes: Small, for 34 to 36; Medium, for 38, 40, 42; Large, for 44, 46, 48. *Order today!*

323 *(Short Sleeves)* $2.10
324 *(Long Sleeves)* $2.20

Free delivery in the U. S. A. upon receipt of prices shown above.

ANGELICA JACKET CO.

New York, 104 W. 48th St., Dept. 12
Chicago, 175 N. Michigan Ave., Dept. W.
St. Louis, 1412 Olive Street
Los Angeles, 1101 S. Main St., Dept. W.

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Advertisements cost $2.00 not exceeding 30 words, additional words 10c each. This rate applies for each insertion.

An extra fee of 25c is charged advertisers who have answers sent care of A.D.A. and in such case we do not furnish name or address to inquirers.

Forms Close on 1st of Month Preceding Month of Issue.

Remittance must accompany classified ads.

BURS RESHARPENED SINCE 1906: Polished and assorted in 1 dozen stamped packages, dozen 15c (regular price 25c) 3 gross $5.00. Testimonials given. Sheun & Co., 6612 Sheridan, Chicago. Mail orders filled.

BURS RECUT—$1.75 per gross, 3 gross $5.00. Over 10 years a bur stoner. I restone only good burs. Send your burs today—prompt return. Ellis J. Witmer, Middlebury, Indiana.

HAVE YOU TRIED DIP? A pure white coating for your old impression trays. It makes them smooth and white as snow. Enough to coat 300 trays, $3.00. Sent direct or through your dealer. Western Metal Co., Bloomington, Illinois.

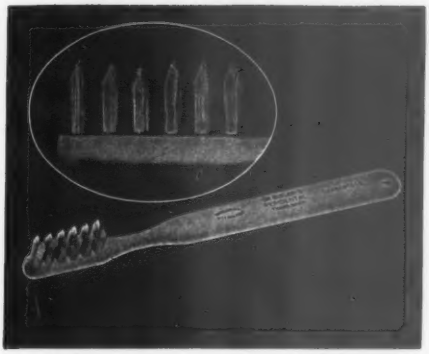
WE BUY AND SELL USED DENTAL EQUIPMENT. What have you? What do you want? Western Metal Co., Bloomington, Illinois.

DENTAL INDEX. Annual Index of Dental Periodical Literature, containing all English periodical literature. A few volumes of each issue are still available. Address American Dental Association, 212 E. Superior St., Chicago, Illinois.

FOR RENT: Modern house, office and two car garage in perfect condition, near public square in industrial town of 1000. No other dentist in town. $25.00 per month. Excellent opportunity. F. H. Stires, M.D., 219 First National Bank Bldg., Canton, Ohio.

(Continued on page A-28)

Prescribe DR. BUTLER
. . the original of this type of brush



Brush manufacturers are solicited by various firms and individuals to "Give us a copy of the Butler" which shows the immense popularity that this particular brush has attained in a very short period of time.

Most of the Profession, however, prefer to prescribe the original of this type and design of brush; therefore, always specify the Butler on their prescriptions.

Have you added your name to that ever-growing outstanding list of progressive members of the Profession dispensing or prescribing the Butler exclusively?

One Only Dr. Butler Brush for your own Personal Use

Sent for only the cost of packing and shipping. Send 20c today! . . . use coupon . . . indicate bristle please.

JOHN O. BUTLER COMPANY ADA 6-36
7359 Cottage Grove Ave., Chicago, Ill.
Enclosed find $ .20 for one brush.
( ) Medium Bleached ( ) Hard Bleached ( ) Extra Hard Bleached ( ) Hard Unbleached ( ) Extra Hard Unbleached ( ) Junior (Child's Brush)
Dr. .....
Address .....
City and State.....

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SINCE 1899 SPECIALIZED SERVICE

A DOCTOR SAYS:

"Defended in a malpractice suit yesterday and we won the case cleanly without paying any damages or without any publicity. If my protective insurance was taken away from me, I believe I would close up my office."

THE
MEDICAL PROTECTIVE COMPANY
OF FORT WAYNE, INDIANA
WHEATON, ILLINOIS

10c a day for only 65 days pays in full for a copy of

The Latest
The Most Comprehensive
The Most Practical
Illustrated, Pronouncing
Word-Book to the Whole of Dentistry

DUNNING and DAVENPORT "Dictionary of Dental Science and Art"

By WILLIAM B. DUNNING, D.D.S., F.A.C.D., Professor of Dentistry, School of Dental and Oral Surgery, Columbia University, N.Y.,

and

S. ELLSWORTH DAVENPORT, JR., D.M.D., F.A.C.D., Formerly Associate Editor, Journal Allied Dental Societies, etc.

79 Illustrations. Tables. 635 Pages. Fabrikoid $6.50.

THE dentist who examines this book will certainly want a copy. It has everything to recommend it to the profession, most important—up-to-date-ness. The book is just off the press; it contains a well balanced survey of the whole of dentistry from paleontology to Dr. Hartman's new desensitizer. It is compact, light and handy and will open flat at any page. The binding is handsome, maroon Fabrikoid, very durable. The pronunciation of each word is given in simple, English phonetic spelling and derivations are included. Other terms of science and medicine having a bearing on dentistry are included for convenience. Handsome illustrations, some in colors, and some excellent charts and tables are included. The authors are well known in dental literary circles, in practical work and in teaching. The book will stand a test for accuracy, scholarship, comprehensiveness, modernity and quality of materials and workmanship. We want you to do the testing. Let us send a copy now. Use order form below. You may remit $3.25 in 30 days, the balance in 60 days.

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Send Dunning & Davenport new Dental Dictionary $6.50.

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Address.....

J.A.D.A. 6-36

Classified Advertising Department

(Continued from page A-26)

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DENTAL AUTO INSIGNIA—Price $2.50, including new style license plate clamp. Suitable for mounting on either end of car. Displayed on your car, this emblem quickly and definitely identifies you as a dentist. It has been designed as the insignia of the regular licensed practitioner of dentistry, embodying the Esculapian rod, with letter D. Wrought in brilliant lilac enamel (official dental color) with metal parts gold plated, it is truly a distinguishable emblem. Sold to members of local, State and American Dental Assoc. members only. Sold to dentists since 1923. The Dental Emblem Co., or dealer, P. O. Box 455-N, New Haven, Conn.

NOTES AND QUOTES

We parents with children still at home with us are passing through the richest part of our earthly pilgrimage. We touch life at more points, we are the medium through which pass more electrifying currents of hope and interest and effort, and we are privileged to love and protect and enjoy more intimately than ever before or after. Never again can we live so fully and so deeply as now. Never again will we be so near the limpid transparence of innocence or touch so closely a joyous acceptance of life as it is. And yet we cloud the brightness of all these swiftly passing delights because our utmost efforts will not make the children perfect; because we will not trust the miraculous principle of growth to unfold the capacities from the human soul far better than we can unfold them; because we face the future with apprehension and not with confidence.—Dorothy Canfield Fisher.

* * *

One need only grow to become gentler in one's judgments.—John Galsworthy.

CHECK THESE USES

Locate Interproximal Cavities and Caries

Locate Recurrent Decay at Margins of Fillings and Inlays

Show Recurrent Decay Under Synthetic Porcelains

Cavity Inspection to Determine Whether Decay Is Eliminated

Show Deposits of Calculus and Stain

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Locate Needle or Foreign Body in Soft Tissue

DOLLAR for DOLLAR BURTON'S DENTAL DIAGNOSTIC SET BRINGS the DENTIST A GREATER RETURN ON HIS INVESTMENT THAN ANYTHING IN HIS OFFICE

Full Information on Request

BURTON

Price of Set $75.00 Complete

CHECK THESE USES

Efficacious in Diagnosing Involvements of Deciduous Teeth

"Cold" Mouth Light

Inspect Cavity Preparation, crown, inlay and filling margins under 10X magnification

Cheek Retraction, Illumination and Reflection Surface

Indicate Frontal Sinus and Antrum Involvements

Indicate Vital and Non-vital Teeth

Indicate Degree of Tooth Vitality

Indicate Resistance Under Occlusal Fillings and Inlays

Aid in Diagnosis of Pulpitis or Hyperemic Pulp

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Check Deciduous Teeth

Supplement X-ray

Through Dealers or Write to Us

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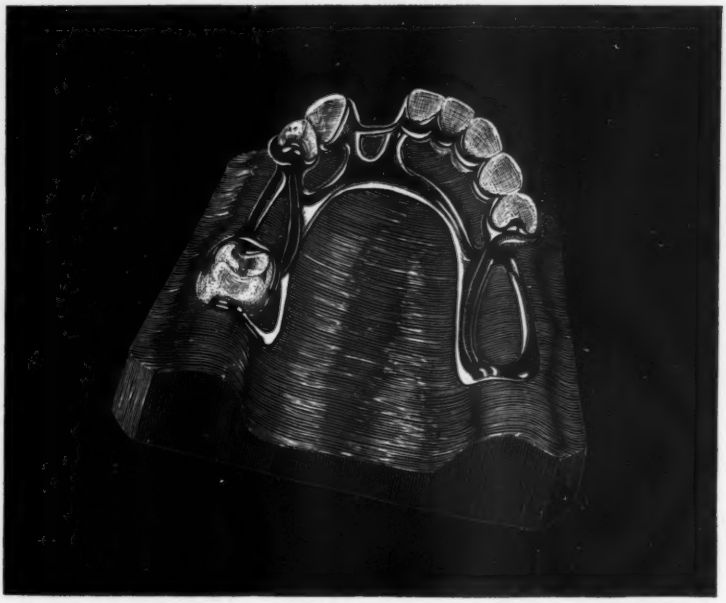
OVER 31,000 DENTISTS USE BURTON EQUIPMENT



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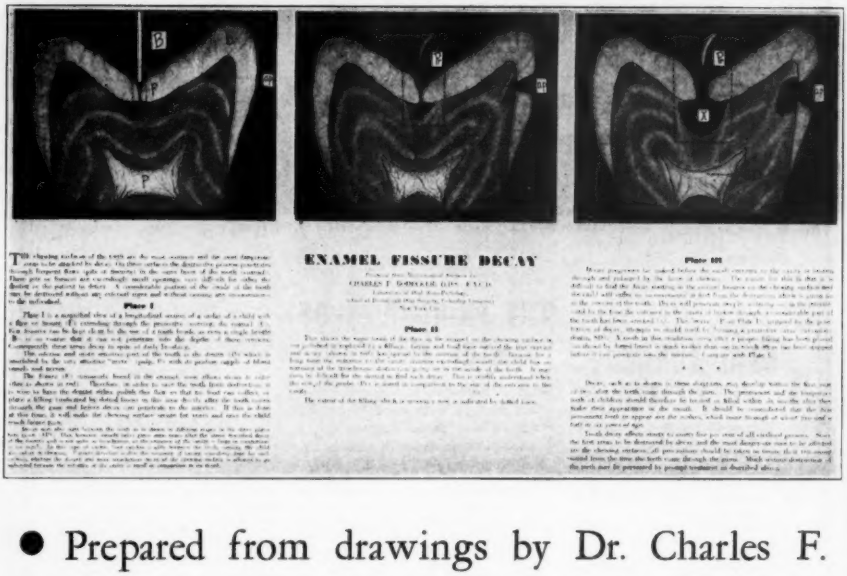

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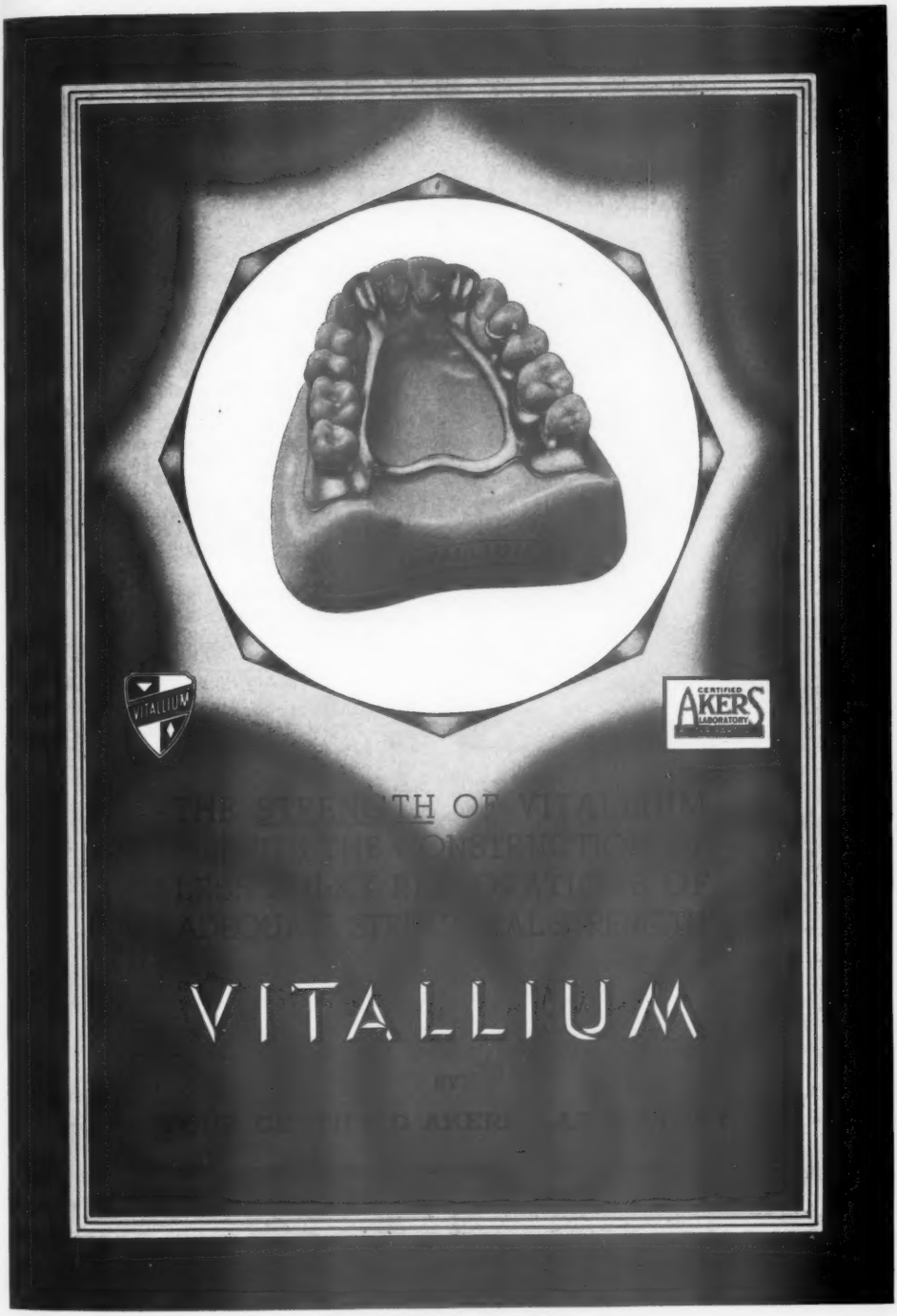

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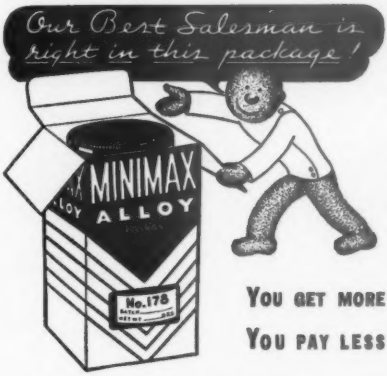

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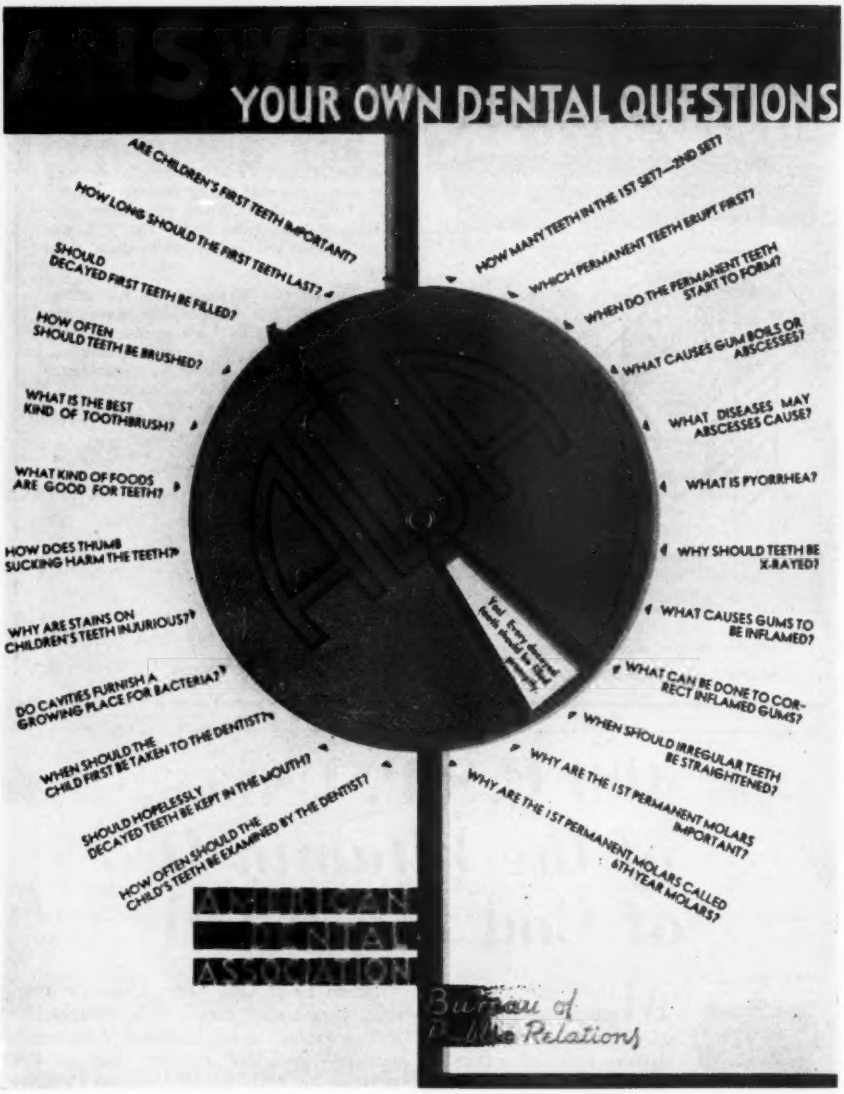
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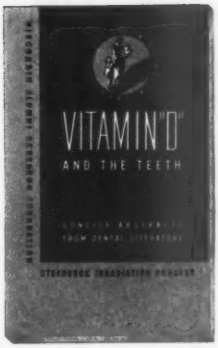

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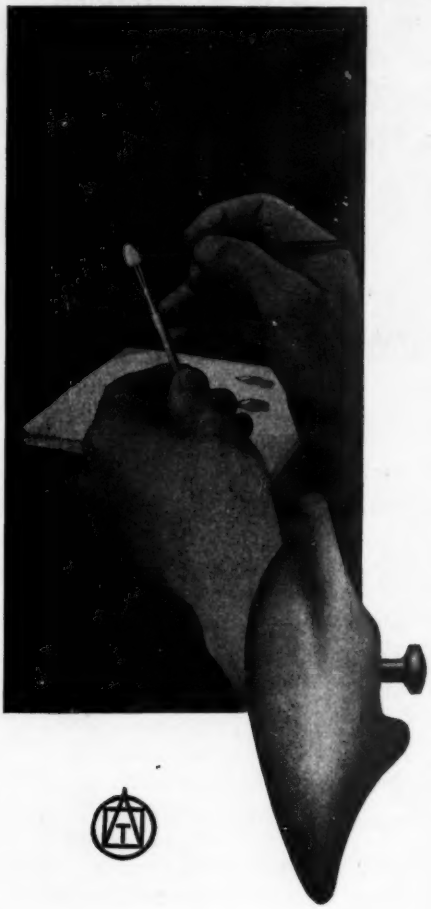

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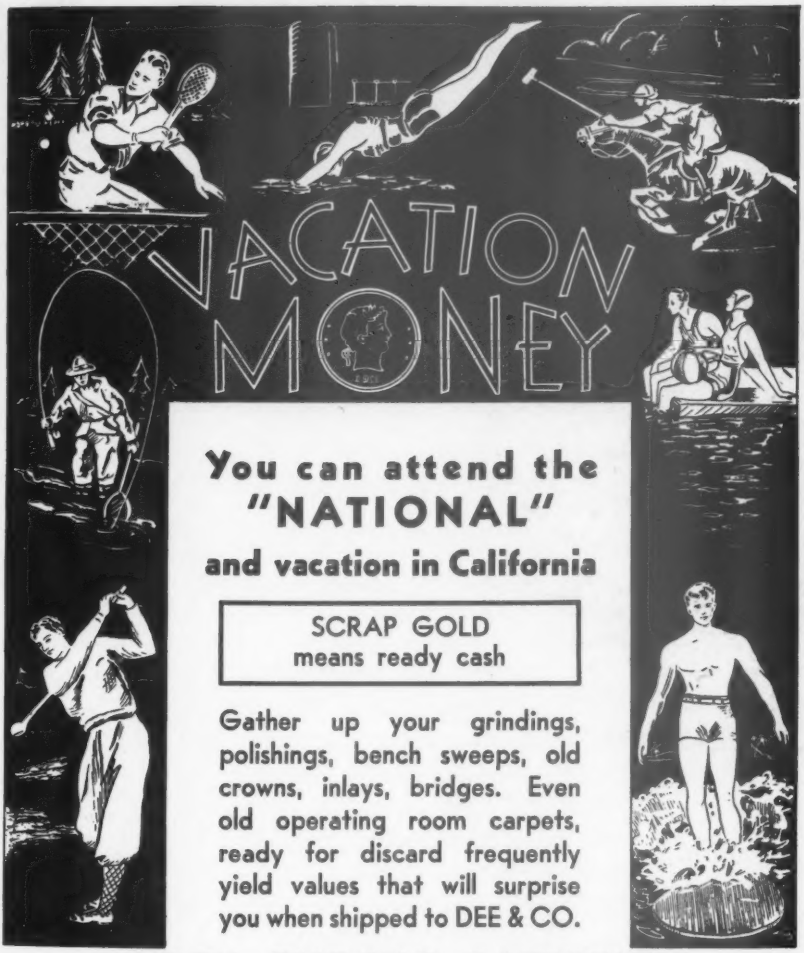

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